ANNUAL REVIEW OF TELECOMMUNICATIONS IN THE GOVERNMENT OF CANADA
1981/1982

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A. Highlights

1. Focus

Recent issues of the Annual Review have been developed as a planning tool which government organizations, including the Department of Communications, can use to shape their proposals for the future. This year, as a prelude to the departmental reporting analysis and the long range planning framework, focus has been centred on potential and achieved accomplishments in reducing telecommunications costs. With the economy struggling to recover from recession, the topic is timely.

The need for strategic and tactical planning, the benefits of economies of scale and ways to tighten management practices are presented; central agencies are alerted to specific areas requiring the development of policies, guidelines and procedures; and, finally, a number of noteworthy cost savings achievements are reviewed.

2. Telecommunications Expenditures, Personnel and Systems

In 1982 Treasury Board replaced the annual Telecommunications Report and Plan with the Information Technology and Systems Plan (ITSP), merging the collection of data from both the telecommunications and EDP disciplines into one reporting format. This has been a significant factor in bringing the two communities together and undoubtedly will result in further benefits through recognition of committee and organization changes.

Total telecommunications expenditures by the 56 out of 63 departments and agencies which reported amounted to almost $450 million. The 63 departments and agencies comprise all federal Government organizations whose telecommunications expenditures exceed $20,000 per year. The reported expenditures (which include telecommunications personnel-related expenditures) represent 89.7% of the total telecommunications expenditures of the Government.

The increase of 14.6% over 1980/81 expenditures is slightly below the historical increase recorded at 15-20% and 2.2% lower than the 1980/81 increase. It is composed of a 21.1% rise in operating expenditures, 4.5% reduction in capital expenditures and 10.1% growth in personnel-related expenditures.

The 1981/82 increase in operating expenditures is attributed to the following factors:

- tariff increases
- implementation of new/updated systems in order to improve and establish service required

- increased emphasis on service to the public requiring additional service
- 1981 Census of Canada
- better reporting

Capital expenditures actually decreased in this reporting period, as opposed to an historical growth of 16-25%. This appears to reflect both a wary approach to capital acquisitions pending a clearer definition of the cost benefits of new technology and a decline in equipment costs resulting from the more competitive market produced by terminal attachment regulation changes.

Estimated federal Government telecommunications person-years totalled 7,311, an increase of 2.1% over last year's estimate. Reporting accuracy remains a problem, however. Forecast growth of person-years by departments and agencies is 3.7% for 1982/83, declining to 1.3% in 1986/87.

Efforts by GTA to develop a standardized model for recording and reporting telecommunications systems data are continuing. With the first phase of development of an Inventory of Telecommunications Applications (IOTA) completed, the project has progressed to Phase 2 - a feasibility study.

The Government Telecommunications Agency has expanded its inter-city network to 24 centres and now includes Sudbury, Kingston, Abbotsford and Charlottetown. In 1981/82 telephone terminals accessing consolidations increased by approximately 10%. Extensive activities are now underway to implement digital technology to replace existing facilities.

Expenditure forecasts and other details are provided in Section C.

3. Progress

3.1 Policy

An update of Government telecommunications administrative policy includes development and distribution of a Telecommunications Management Manual, publication of Treasury Board's APM Chapter 303 - Common Services, GTA's recently-developed Telecommunications Training Syllabus and a proposed new universal call code system. Appendix I presents two departmental case studies - Health and Welfare Canada's policy recall codes and Transport Canada's application of Treasury Board's Telecommunications Policy.

3.2 Planning

This year's Annual Review includes comprehensive coverage of a development program for Government telecommunications highlighting voice services, satellite communications, enhanced teleconferencing, electronic messaging, EDP communications, shared data/messaging services and local area networks. In addition, GTA's activities are reported in detail, as are selected departmental activities.

ITSPs show that the number of departments and agencies reporting substantial plans have decreased, but the overall concern with planning has increased significantly. In particular, a deep awareness of and attention to the technological changes are noted. Training needs remain high on the priority list; numerous field trials and feasibility studies are recorded; and perceived policy requirements have been identified.

4. Key Recommendations

Government telecommunications planning is being addressed by the Government Telecommunications Agency with emphasis on satisfying the needs of the user with state-of-the-art technology and saving the Government money through economies of scale. The Government's policies on common services and telecommunications both reinforce the requirement for departments and agencies to seek the use of shared services. Critical feedback of reporting requirements as defined by Treasury Board is being addressed in part by a "Reporting Requirements Sub-Group" of an inter-departmental working group on EDP and telecommunications.

Recommendation 1: Increased emphasis must be placed on the need to better inform departments and agencies on government telecommunications planning activities.

Cognizant of the versatility and declining costs of desktop micro systems and the subsequent modifying of word processing equipment more closely to resemble the micros, managers should carefully examine their requirements before purchasing or leasing word processors.

Recommendation 2: Word processors should be acquired for specialized applications only.

Despite the dramatic evolutionary changes taking place, Government organizations should not be unduly influenced into delaying acquisition of equipment on the basis of imminent obsolescence. Hands-on experience with the products offered today will prepare personnel for the level of sophistication that will herald the next generation.

Recommendation 3: Departments and agencies should take advantage of the productivity gains to be achieved through state-of-the-art equipment by carefully considering their needs and following a phased plan.

By more actively advising their organizations in terms of planning and management practices and by widely distributing material of an instructional or informative nature, telecommunications staffs can play a significant part in improving costs, services and procedures.

Recommendation 4: Telecommunications staffs should -

a) ensure that management practices are tightened in their organizations in accordance with Government policies and Section B 2.3 of this report;

b) keep senior management and other personnel advised and informed by disseminating pertinent information which will enhance their knowledge, awareness and understanding of telecommunications-related changes pertaining to their needs; and

c) be instrumental in ensuring that comprehensive telecommunications planning practices are developed and pursued in coordination with the EDP planning of the organization, in accordance with the requirements of Government policies, and with due consideration to Government long range development plans.

In support of departmental planning, office automation implementation and related issues, central agency policies, mechanisms and procedures are urgently required.

Recommendation 5: The requirements outlined in Section B 2.4 and Section F 2.3.6 should be studied by all concerned and actioned by the appropriate authority.

Training and information needs remain urgent and inadequately respected.

Recommendation 6: a) Central agency basic and advanced technical training courses should be developed in the areas of telecommunications and electronic data processing.

b) On-the-job information on state-of-the-art technology should be provided to Government departments by a central agency on a periodic basis.

c) Up-to-date information on state-of-the-art technology should be provided to Government departments by a central agency on a periodic basis.

B. Reducing Telecommunications Expenditures

1. General Remarks

As 1982 came to a close, restraint measures implemented within the federal Government demanded a sharpening of management practices.

An analysis of Information Technology and Systems Plans (ITSPs), section F 2.3, corroborates that Government telecommunications management planning policies and practices in some departments are being pursued with cost-conscious intensity. As well, a spot examination of telephone expenditures by Treasury Board revealed that most departments with significant telephone expenditures are concentrating on cost control with technical management and consequently telephone expenditures are "not out of control".

Nevertheless, major savings are still possible for the government as a whole and individual departments by developing planning and updating mechanisms and policies, achieving economies of scale through shared services, and tightening management practices.

2. Cost Savings Potential

2.1 Planning Mechanisms

Planning is conceived from forethought and born of action - not reaction. It walks hand-in-hand with two basic Government goals: efficiency and cost effectiveness.

Effective planning is double-barreled. It consists of a strategic plan, which is concerned with how goals and objectives can be achieved and a tactical plan, that provides the specific measures needed to reach those goals and objectives. As explained by Robert J. Michael of First City Bancorporation in an article in Business Communications Review, "Where strategic planning puts the infra-structure in place, tactical planning follows on to build the superstructure." The strategic plan, that encompasses five-to-ten years, should be reviewed annually, followed by tactical plan adjustments according to the changing impacts of environmental factors.

In developing an organization's telecommunications plan, a planner must

- understand and recognize the corporate objectives of the organization and aim to achieve them;
- be flexible: identify the evolution of change, keep abreast of the changing trends, and adjust accordingly;

- identify functional needs, remembering that technology is not an end in itself, but a means to an end;
- be cognizant of and work in harmony with the goals of the data processing strategic plan of the organization.

2.2 Economies of Scale

The cost effectiveness of the shared services/centralized management approach to the provision of telecommunications in the Government has been reinforced by the Common Services Policy issued by Treasury Board in 1982. It is expected that over the next few years, with increased emphasis on sharing and consolidations for maximum net savings, the rate of growth of demand in shared systems will exceed that of the total growth rate for Government telecommunications.

Upgrading of consolidations through technology-based service, as being implemented by GTA (section F 2.1), will offer not only improved station features but modern network services such as dial tandeming and automatic selection of the most economical long distance route. These features will make possible more cost effective telephone configurations, optimized inter-city network routing, a higher proportion of calls originated and answered without operator or secretarial intervention and better control of telecommunications expenditures through complete call detail recording and toll restriction capabilities.

Decentralization of digital switching facilities by individual users would result in small local packets of digitally interconnected office equipment. This approach should be discouraged where needs go beyond the local area network (LAN) configuration. These require many more types of interconnecting data facilities and a focal point for accessing inter-city digital facilities - both costly concerns.

The development of suitable data support capabilities (such as local and inter-city digital trunking, time of day class of service restriction, local data loop up to 56K bps, sub-speech channel multiplexing capability with sub-channel addressing) is being planned.

In recognition that the Government Data Network Service (GDNS) requires updating, GTA is investigating the development of a national shared store and forward message, facsimile and CWP service.

In the interim, an additional shared service is being offered in the form of the Government Electronic Messaging Service (GEMS) which should prove to be cost effective with bulk discounts and help departments move into office automation equipment compatible with the long term plans for Government telecommunications development.

2.3 Management Practices

Many of the following observations reflect the need for telecom staffs to be more active in the role of advisor to their organizations. One way is to ensure instructions, letters, etc. are distributed, reproduced, rewritten if necessary for individual departmental needs.

These suggested practices should be considered in compliance with the policies and guidelines of APM 435 and 436:

- Centralized control of the budget for administrative telephone expenditures within a department is desirable to promote efficiency within tariff options and to spot wasteful practices.
- Technical competence within departments should be assured for effective cost control.
- Where departments qualify for exemption of shared services, tendering procedures should be undertaken in the areas where terminal attachment is approved.
- Call codes should be used by no more than five people (preferably one or two) to maximize administrative controls.
- Inter-city calling guides should be carefully read and used. The following routing errors are incurring unnecessary costs:
  - (i) Incorrect use of INWATS service numbers such as the zone 6 number instead of the much less costly zone 3 number.
  - (ii) Use of INWATS when direct lines are available.
  - (iii) Use of user dial OUTWATS when direct lines are available.

- GTA manages dedicated INWATS and OUTWATS groups for several departments and agencies. Through negotiations with TCTS, the Agency is in a position to provide considerable savings in comparison with individual subscriber-controlled WATS groups.

- Personnel should be advised that in the National Capital Region free calling area INWATS service should not be used to access the Government network from a non-Government telephone. Instead, they should dial 996-5432 at no charge at all. This mistake is costing an average of $6000 monthly.

- As a follow-up to the achievement of consolidated billing, data is being gathered by GTA from certain departments on their leased circuits. Participating departments obtain discount rates for circuits that, independently, would usually be charged at higher rates where they are obtained directly from common carriers.

- Overdue accounts can be a costly, but avoidable, expense. Although not visible to the user, interest costs are incurred on any unpaid balances of the GTA Revolving Fund at the end of each month.

- The Government telephone network should be used for data applications during off-peak hours wherever this is cost-effective.

- Effects of cutbacks in departmental travel budgets may be alleviated through the use of the Government teleconference service. The current technology offers unique opportunities for increased cost effectiveness. While teleconferencing is not advocated as a substitute for all travel, it should be considered as a means of supplementing mandatory travel requirements and enhancing productivity.

- Telex and GDNS users should note that GTA has negotiated a discount rate for heavy volume user terminals.

- Telex directory listings have become increasingly expensive. Although each Telex and GDNS station is entitled to a free listing, bold printing, extra lines and extra listing (for French and English) all cost extra. A circular letter on directories has been developed by GTA to assist departments in reducing costs.

- To help keep Government of Canada directory costs down, APM 436 directs that listing of personal names in departmental sections should be limited to those essential to the operational function of the organization.

- Most departments could effect substantial savings in their existing telecom equipment expenditures by re-examining their present configurations. Physical moves and reorganizations should always be accompanied by such evaluations. They should be launched at a high managerial level and are apt to be most effective if carried out in consultation with GTA representatives for the sake of objectivity.

- Hardware and leased line billing is not always accurate. Managers should make a habit of verifying that the equipment for which they are billed is identical to that which is on their inventories.

- Abusive use of the Government inter-city network cannot be controlled to the extent of management requirements with the limited equipment in place. However, complete call detail will be available in September 1984 in NCR and elsewhere according to the schedule for enhanced digital consolidations.

2.4 Central Agencies

- Integrated planning and coordinating mechanisms should be established to

  (1) develop norms or performance indicators which will allow telecom managers to measure their performance. Simple indicators would include: the actual cost/station vs TBC guideline; number of speakerphones and automatic dialers not used in emergency or operations rooms or in support of handicapped persons; a listing of divisions in descending order of cost/station; long distance cost per employee; etc...

  (2) develop procedures for the coordinated technical planning by GTA, Public Works and departments; inventory control; quality of service criteria for telephone systems which support the primary interface with the public; etc...

  (3) deal in an organized way with the various categories of integrated office automation systems.

(4) interface with inter-departmental committees and Working Groups, e.g. TAC Working Group on Planning.

(5) streamline the process of ITSP submissions to enhance reporting in the Annual Review.

- Treasury Board policy should be developed to control entitlements to special purpose telephone equipment such as hands-free telephones, automatic dialers and special intercom systems. Where TB guidelines are exceeded, a requirement for managers to authorize the exception should be established.

- In line with potential savings in the tendering of Ottawa-Toronto inter-city circuits, competitive bidding procedure studies should be extended to all routes subject to interconnection.

3. Cost Savings Achievements

Within the past year substantial cost savings were initiated through the following activities:

- A significant achievement was attained in the area of procurement procedures and consolidated billings from common carriers for leased TCTS services. This was based on work initiated by TAC to investigate the potential savings in leased telecommunication expenditures if the Government could act as a single customer rather than a number of organizations acting independently. During the past year, leased TCTS services used by DND, DOE/AES, DSS, Transport Canada and GTA were consolidated under the Telpak account managed by GTA. The transfer of common carrier billings from users to the GTA account became effective April 1, 1982 and will realize about $1.8 million savings per annum for the Government.

- Following the decision by the CRTC allowing CNCP Telecommunications to provide telecommunications services by interconnecting with Bell Canada facilities and cognizant of the Government policy of fostering the competitive process in the acquisition of telecommunications goods and services, GTA sought request for proposals from both major carriers to provide the intercity circuits between Ottawa and Toronto. An analysis of the two responses showed the CNCP proposals to be the more cost beneficial and the transfer of circuits from TCTS to CNCP was completed.

- Wide Area Telephone Service (WATS) lines were increased by 55.5 per cent to 1,365 circuits. Used in lieu of more costly methods of communication, WATS usage represents a substantial savings for Government as well as providing a means to satisfy expanding Government information program needs.

- Based on on-going studies within GTA, the estimated aggregate net savings derived by the Government are of the order of 40 per cent as compared with commercial services available directly from the common carriers (e.g., Direct Distance Dialing, Telex).

- For Government of Canada directory purpose, amalgamation of all telephone consolidations within each region was completed in 1981/82 to minimize production costs. The resulting cost benefit indicates substantial savings over the previous year.

Treasury Board initiatives included issuance of administrative practices related to spending controls on Long Distance Telephone Calls (see APM Chapter 436) and the release of a letter on the subject of restraint of Government expenditures (including telecommunications) from the Secretary to Deputy Heads in September, 1982.

C. Telecommunications Expenditures, Personnel and Systems

1. Telecommunications Expenditures and Related Personnel

1.1 Introduction

This section of the Annual Review deals with telecommunications expenditures and personnel involved in providing telecommunications services within the federal Government of Canada. Under the direction of Treasury Board Canada and with the authority specified in Chapter 435 of the Administration Policy Manual, this information was requested via the telecommunications section of the Information Technology and Systems Plan. All departments and agencies named in Schedules A and B of the Financial Administration Act whose telecommunications expenditures exceeded $20,000 per year were canvassed. Information for 1981/82 was requested from 63 departments and agencies, an increase of four over 1980/81. The following departments/agencies were requested for the first time to submit telecommunications sections of the Information Technology and Systems Plan: Fitness and Amateur Sports, Social Science and Humanities Research Council, Ministry of State for Social Development and the Tariff Board.

Of the 63 departments requested to submit returns, 56 responded. Analysis of Public Accounts records indicates that the total expenditures reported by the 56 departments represents 89.7% of the total telecommunications expenditures. Data received through these reports have been used to estimate expenditures for the federal Government which appear in the tables and graphs at the end of Section C.

1.2 Information Technology & Systems Plan - Procedure & Response

1.2.1 Procedure

In 1982, Treasury Board, Department of Communications and the telecommunications community in general agreed to implement changes to the process used to gather telecommunications resource information. Initial assessment of the environment indicated that as a result of the linkage of telecommunications and EDP technologies, benefits could be derived from inter-relating the telecommunications and EDP annual reports. This was done with the issuance of a combined document identified as the Information Technology and Systems Plan (ITSP). This new report however maintained a distinction between telecommunications and EDP having each reported in separate sections. The format and specifications of the telecommunications section of the ITSP remained basically unchanged from what was previously the Telecommunications Report and Plan. With the combined request for telecommunications and EDP information came a change in the due date from June 30 to October 31.

It is anticipated that further modification of the format, content and methodology used to gather telecommunications resource information will be implemented in the near future.

As in past years, seminars were held in March, 1982 to familiarize departmental telecommunications personnel with the reporting requirements. Following these seminars, Treasury Board formally issued the Information Technology and Systems Plan to departments for completion by October 31, 1982.

1.2.2 Response

Responses to Treasury Board by the date requested was poor and considerable effort was required to ensure the majority of departments eventually responded. The following table shows the record of receipt.

DATE RECEIVED	% OF TOTAL DEPTS REC'D
Oct. 31/82 (due date)	3.0%
Nov. 31/82	40.6%
Dec. 31/82	53.1%
Jan. 31/83	73.4%
Feb. 28/83	89.0%
NOT RECEIVED	10.9%

Feedback from departmental telecommunications personnel suggests that this slow response was mainly due to the following circumstances:

1. lack of resources to perform the work involved in completing the ITSP; i.e. knowledgeable personnel, automated systems
2. difficulties within the department of collecting telecommunications expenditure and planning information
3. delays in completion of the EDP section extended the time for formal submission of the telecommunications section

1.3 Activities in Progress Directly Affecting ITSP

During 1982 an ACIS EDP/Telecom sub-working group was formed with the responsibility of developing recommended reporting requirements for future Information Technology and Systems Plans. This sub-working group is composed of both telecommunications (TAC members) and EDP (ACIS members) from throughout the federal Government and is currently assessing the benefits derived from information submitted in ITSPs. Recommendations concerning future reporting requirements should satisfy the needs of the EDP/Telecom community generally.

In addition, a TAC Working Group responsible for developing telecommunications definitions and expenditure coding continued to make progress. Activities of this Working Group should provide support for managing telecommunications resources. Current activities support the planned approach to an improved federal Government inventory system and changes to the telecom financial coding structure.

In support of Government telecommunications planning functions in general, a TAC Working Group on Planning has recently been established.

1.4 Financial Section

1.4.1 Total Telecommunications Expenditures (Refer to Table 1)

Total telecommunications expenditures (including telecommunications personnel related expenditures) for 1981/82, amounted to $449,686,000, an increase of 14.6% over 1980/81. A more detailed look shows this increase is composed of a 21.1% increase in operating expenditures, 4.5% decrease in capital expenditures and a 10.4% increase in personnel-related expenditures.

Historically total telecommunications expenditures have increased at between 15-20% annually with the 1980/81 increase measuring 16.8%. Total telecommunications expenditures vary significantly in their distribution across departments. Table 3 shows that two departments (National Defence and RCMP) accounted for almost half of the expenditures, whereas the forty smallest departments by expenditure account for only 6.9%

Analysis of all departments reporting total telecommunications expenditures in excess of one million dollars for 1981/82 reveals growth of 12% in their total telecommunications expenditures. The remaining reporting departments measured growth of 20.5% in their total telecommunications expenditures.

1.4.2 Telecommunications Operating Expenditures (Refer to Table 1)

Total telecommunications operating expenditures, which constitutes 57.9% of total telecommunications expenditures, increased by 21.1% in 1981/82, slightly higher than the 17.5% increase forecast in the last edition of the Annual Review. Operating expenditures are detailed in Table 1 and from information there it is evident that telephone services from the Common Carriers and from GTA account for the increase of the total operating expenditures.

Total cost for services demanded by departments and agencies through the Government Telecommunications Agency (GTA) increased by 26.7% in 1981/82. The major components of this increase were voice intercity shared services (25%), voice intercity customized services (47.4%) and local voice services (23.1%).

Other components of the GTA billing increased by 23.9% and comprised only 14.3% of the total billing. Therefore, they did not substantially contribute to the overall percentage increase.

The major departments reporting increases in voice telecommunication services from the Common Carriers and GTA are:

1) National Defence
2) Transport Canada
3) Health & Welfare
4) Correctional Services
5) Statistics Canada
6) Public Service Commission
7) National Film Board
8) Veterans Affairs
9) Justice

The increase in these expenditures is attributed to a variety of factors:

1) tariff increases
2) implementation of new/updated systems in order to improve and establish service required
3) relocation or reorganization of departments
4) increased emphasis on service to the public requiring additional service
5) 1981 Census of Canada
6) better reporting

Computer communications services, also a component of operating expenditures, showed a significant increase of 51.6%. Past studies have shown that expenditures related to computer communications services were under-reported. It is therefore concluded that this increase is largely a result of more complete reporting.

Rental expenditures, another component of telecommunications operating expenditures, changed significantly from the previous year. For 1981/82 these expenditures decreased by 31.8%. In 1980/81 new economic objects and related definitions were introduced resulting in confusion within the community regarding rental expenditures and Common Carrier service expenditures. At that time is was felt expenditures belonging in the category of Common Carrier services were being reported under rentals, producing unrealistically high rental expenditures. Therefore, the decrease in the 1981/82 rental expenditure is attributed to better understanding by the community of the financial coding structure.

1.4.3 Total Telecommunications Capital Expenditures (Refer to Table 1)

Total telecommunications capital expenditures for 1981/82 decreased by 4.5% to $42,100,000. Historically, growth of telecommunications capital expenditures has been between 16 - 25%. The uncharacteristic decline in telecommunications capital expenditures is attributed to conditions that exist within the community. Uncertainty with respect to benefit from terminal attachment has given many in the community a wait and see attitude, thus having the effect of delaying capital acquisitions until a clearer view of appropriate action is established. In addition, departments deciding to acquire telecommunications equipment are tending towards renting/leasing as an alternative to purchasing thus reducing the capital expenditures reported.

Another factor contributing to the decline in capital expenditures relates to new interconnect regulations. Departments which have made capital acquisitions during 1981/82 have found that as a result of competition among terminal attachment companies the cost of equipment has declined.

1.4.4 Telecommunications Personnel and Related Expenditures (Refer to Tables 1, 4 and Graph 1)

Total telecommunications person-years reported for 1981/82 amounted to 7,101. However, when adjusted for departments not reporting, the total estimated telecommunications person-years for the federal Government amounts to 7,311. This constitutes an increase of 2.1% over last year's estimate. Problems continue to be encountered by departments when attempting to determine their telecommunications person-years and as a result the accuracy of this information remains questionable.

It can be observed from Graph 1 that the distribution of person-years remained similar to that reported in 1980/81.

Telecommunications personnel-related expenditures which, are comprised of salaries, professional and special services, increased in 1981/82 by 10.4% to $147,436,000. This is due to an increase in professional and special services of 135.5% and an increase in salary expenditures of 9.5%. The increase in professional and special services although dramatic is not significant due to its magnitude. The increase in salary expenditures which is the major component of total personnel expenditures is due to an increase of 2.1% in the number of person-years utilized and an average salary increase per telecommunications person-year of 7.3%.

1.4.5 Shared, Customized and Departmental Services

Analysis of 1978/79 through 1981/82 telecommunications expenditures reveals the following breakdown of expenditures by shared, customized and departmental services.

% of TOTAL

Voice	Shared	Customized	Departmental
1981/82	45.9%	3.6%	50.5%
1980/81	45.2%	2.6%	52.2%
1979/80	38.3%	3.4%	58.3%
1978/79	42.6%	3.8%	53.6%

Data	Shared	Customized	Departmental
1981/82	8.5%	5.2%	86.3%
1980/81	4.4%	3.1%	92.5%
1979/80	4.4%	3.9%	91.7%
1978/79	3.3%	2.5%	94.2%

1.5 Government Telecommunications Agency Charges

1.5.1 Charges to Government Departments for Telecommunications Services

1981/82 GTA total billings for services provided to departments increased by 26.7% over 1980/81. This was due to 25% increase in voice intercity shared services, 47.4% increase in voice intercity customized services, 23.1% increase in local voice services, 7.6% increase in intercity message network and 40.2% increase in intercity customized data services. These increases are significantly larger than the historical trend. It is interesting to note that both customized voice services and customized data services have each increased by over 40%. Closer analysis of GTA charges to departments shows that billing increases were spread relatively evenly over all departments.

The following table provides details of GTA billings for the years 1980/81 and 1981/82.

		$ (000)	% of Total	Increase from previous year
1981/1982	Intercity Shared Services	50,396	70.7%	25.0%
	Intercity Cust. Services	7,345	10.3%	47.4%
	Total Intercity Services	57,741	81.%	27.5%
	Local Services	3,376	4.7%	23.1%
	Intercity Message Services	4,449	6.2%	7.6%
	Intercity Cust. Data Services	5,762	8.1%	40.2%
	Total Intercity Services	10,211	14.3%	23.9%
	Local Services	*	*	*
	Total Data & Voice Services	71,328	100%	26.7%
1980/1981	Intercity Shared Services	40,316	71.6%	9.7%
	Intercity Cust. Services	4,983	8.9%	- 7.1%
	Total Intercity Services	45,299	80.5%	7.6%
	Local Services	2,742	4.9%	12.4%
	Intercity Message Services	4,135	7.3%	8.6%
	Intercity Cust. Data Services	4,109	7.3%	7.4%
	Total Intercity Services	8,244	14.6%	7.9%
	Local Services	*	*	*
	Total Data & Voice Services	56,285	100%	7.9%

1.5.2 GTA Operating Expenditures

Operating expenditures represent costs to GTA for services it manages and makes available to departments on a cost recovery basis. Expenditures for 1981/82 amounted to $64,413,083, an increase of 26.3% from 1980/81. This increase is attributed to both tariff revisions and increases in demand for services through GTA.

1.5.3 GTA Overhead Expenses

GTA overhead expenditures for 1981/82 amounted to $6,652,514, which is 9.4% of the total costs recovered. This percentage has continued to maintain a downward trend as the total cost for services increases.

1.5.4 Comparison of Costs of Using Government Intercity (IX) Network and Public Long Distance Network

The following information provides a comparison of the costs involved in placing some typical long distance calls from government telephones using direct access to the government intercity (IX) network and direct dialing (DDD) on the public long distance network.

COST OF TYPICAL 3 MINUTE LONG DISTANCE CALLS

DURING BUSINESS HOURS

Origin	Destination	*IX Network (direct access)	Public Long Distance Network (DDD)	% Cost Savings Using IX Network
Ottawa	Kingston	$ .75	$1.57	52.2%
Ottawa	Montreal	$ .81	$1.70	52.3%
Ottawa	Toronto	$ .87	$1.85	53.0%
Ottawa	Windsor	$1.38	$1.91	27.7%
Ottawa	Calgary	$1.68	$3.15	46.7%
Ottawa	Halifax	$1.29	$2.58	50.0%
Ottawa	Vancouver	$1.98	$3.15	37.1%
Ottawa	Winnipeg	$1.44	$2.85	49.5%

* Government intercity network charges used to derive the above information include the portion of GTA overhead applicable to these services. If operator assistance is required an additional charge of $.50 per call is levied.

Based on ongoing studies within GTA, the estimated aggregate net savings derived by Government are of the order of 40% as compared with commercial services available directly from the common carriers (e.g., direct distance dialling).

The sizable savings that result from using the government intercity network should encourage its use whenever possible and should demonstrate to telecommunications management personnel the value of monitoring the telephone usage within their departments as set out in Chapter 436, section .6, of the Administrative Policy Manual.

1.6 Forecast of Expenditures and Personnel

Tables 5 and 6 contain forecast data for the years 1982/83 through 1986/87. Telecommunications operating and capital expenditures have been forecast using exponential regression techniques while forecast data for personnel related expenditures have been developed using growth in person-years reported by departments and cost increases of 6% for 1982/83, 5% for 1983/84 and 7% for subsequent years. The forecast for subsequent years is not based on specific fact and is subject to changes in Government policy.

Government priorities in the period covered by this report indicate increasing emphasis on telecommunications improvements.

Total telecommunications expenditures including personnel related expenditures are forecast to increase by 16.1% in 1982/83, 11.8% in 1983/84, 12.6% in 1984/85, 12.4% in 1985/86 and by 12.6 in 1986/87.

Total telecommunications expenditures forecasts were developed by using forecasts of its component parts. Operating expenditure forecasts indicate growth in 1982/83 of 13.1%, growth in 1983/84 and 1984/85 of 11.7% and growth in 1985/86 and 1986/87 of 12.5%.

Operating and capital expenditures together are forecast to increase by 19.1% in 1982/83, 13.3% in 1983/84, 13.5% in 1984/85 and 14.2% in 1985/86 and 1986/87.

Because of the limited nature of their derivation and the unknown influences which may affect future policy, the forecasts contained herein are offered as indicators only and not as inflexible planning aids.

2. Telecommunications Systems Review

The last issue of the Annual Review provided a summary of the problems associated with gathering and presenting information pertaining to government telecommunications systems. As details of the components and characteristics of systems are required by departments and the Government Telecommunications Agency (GTA) for effective planning, monitoring and control, GTA has continued its efforts to develop a standardized method for recording and reporting telecommunications systems data.

The 1981/82 review of existing systems highlights the shared voice and data services administered by GTA.

2.1 Inventory of Telecommunications Applications (IOTA)

Since last reported, the first phase in the development of IOTA has been completed and the second phase is in progress.

2.1.1 Phase 1 - Needs Identification Study

Information for this phase of the project was supplied by key personnel within Environment Canada, Revenue Canada - Customs and Excise, National Energy Board and the Department of Communications. The study report presented to GTA identified information processing and data element requirements, management and administration data flows and environmental factors to be incorporated in the development of an integrated information system. The key recommendation of the study report was that the development of IOTA proceed to the next phase.

2.1.2 Phase 2 - Feasibility Study

The feasibility study is required in order to demonstrate whether or not a government-wide standard for telecommunications inventories can be developed that will meet the needs of departments involved in planning, establishing and managing the effective use of telecommunications facilities and services.

Participants in the study are representatives from Employment and Immigration Canada, Environment Canada, Supply and Services Canada, Indian and Northern Affairs, Public Works Canada, National Research Council Canada, National Library of Canada, Ministry of State for Economic and Regional Development, Department of Communications and Treasury Board Canada.

The feasibility study report will:

a) identify the characteristics of existing or planned similar systems within departments;

b) show the need of departments to gather and analyze information in order to comply with Treasury Board, GTA and departmental policies;

c) describe the information requirements of Treasury Board and GTA as central coordinators of the telecommunications facilities and services used by the Government;

d) demonstrate a conceptual system which will meet the above requirements and which is structured such that a department can use a module to develop its own customized system;

e) identify alternative hardware/software configurations that can execute the conceptual system;

f) identify the financial impact of selecting any alternative.

If the development of IOTA is feasible, progress will be presented in subsequent issues of this Review.

2.2 Government Telecommunications Agency Services

2.2.1 Local Shared Services

The Government Telephone Network has been expanded to 24 centres by the consolidation of services in Sudbury and Kingston, Ontario, Abbotsford, B.C. and Charlottetown, P.E.I. Within each consolidation, participating federal Government departments/ agencies are linked by sharing the use of a Centrex or Private Automatic Branch Exchange (PABX) for local service. GTA is presently examining the cost benefits of consolidating services at Sydney, N.S. and Thunder Bay, Ontario.

In 1981/82 there was an overall increase of 16,710 (10.30%) telephone terminals accessing consolidations. The following table presents a five year comparison of total terminals accessing consolidations.

TOTAL TELEPHONE TERMINALS ACCESSING CONSOLIDATIONS

	MAIN LINES	EXTENSIONS	TOTAL TERMINALS	PBX LOCALS & EXTENSIONS	TOTAL
1977/78	78,289	57,384	135,673	NOT AVAILABLE	-
1978/79	75,391	64,309	139,700	17,110	156,810
1979/80	75,520	58,377	133,897	16,451	150,348
1980/81	73,419	58,795	132,214	14,845	147,059
1981/82	77,284	61,075	138,359	25,410	163,769

New and upgraded call detail recording systems permitting equitable cost allocation to users were implemented in 1981/82. All of the consolidations listed below now have the capability of producing a complete detailed profile record of selected telephone calls for accounting and usage reporting purposes.

Call Detail Recording Systems	
New	Upgraded
Rimouski, Que. (SL-1)	St. John's, Nfld (LAMA)
Kingston, Ont. (TABS)	Quebec, Que. (TABS)
Sudbury, Ont. (TABS)	Montreal, Que. (TABS)
Nanaimo, B.C. (SL-1)	Sherbrooke, Que. (TABS)
Abbotsford, B.C. (SL-1)	Toronto, Ont. (SL-1
	London, Ont. (TABS)
	Hamilton/Burlington, Ont (TDA)

2.2.2. Government Data Network Service (GDNS)

The Government low speed computer-controlled message and data switching system contracted with CN/CP Telecommunications is now under study with a view to upgrading on the basis of modern shared data system. Departments with high message volumes are opting for the updated terminals which will reduce line rental through greater message volumes in shorter time periods.

TABLE 1

TELECOMMUNICATIONS EXPENDITURES BY CATEGORY

OPERATING EXPENDITURES	1979/80 ($000)	% CHANGE	1980/81 ($000)	% CHANGE	1981/82 ($000)
Telephone Services-Common Carrier, GTA	112,735		110,886		164,490
Message, Data Communications Services-Common Carrier, GTA	48,323		52,815		49,983
Other Communication Services	15,031		10,349		9,857
Computer Communications Services	N/A		11,843		17,949
Repair-Lines Telecom Equipment Broadcasting, Radio & TV Relay & Booster Stations, Telephone Exchanges, Telecom Equipment for Computers	4,496		8,731		4,197
Rentals-Telecom Equipment not included in normal telephone service	11,035		20,169		13,764
Comparable Total (Operating)	191,620	5.7	202,554		
TOTAL OPERATING	191,620	12.1	214,793	21.1	260,150
CAPITAL EXPENDITURES					
Telecom Equipment-Related Parts & Consumables excl Computers (ADJUSTED)	15,781		5,023		5,319
Telephone & Telegraph Lines, Broadcasting Radio & TV Relay & Booster Stations, Telephone Exchanges			17		276
Telecom Equipment excl Computers (ADJUSTED)	33,372		39,025		36,505
Comparable Total (Capital)	49,153	46.9	72,205		
TOTAL CAPITAL	49,153	46.9	72,222		42,100
ADJUSTED TOTAL			44,065	- 4.5	42,100
PERSONNEL RELATED EXPENDITURES					
Professional & Special Services	656		939		2,212
Salaries	108,114		132,569		145,224
TOTAL PERSONNEL	108,770	22.7	133,508	10.4	147,436

* Comparable Totals: As a result of the implementation of specific economic objects for telecommunications, the 1980/81 totals do not compare with the previous years total. Adjustments have been made to 1980/81 totals in order to produce totals that are comparable with the previous year.

** Capital expenditures reported in 1980/81 have been adjusted to reflect refinements made by National Defence in the separation of telecommunications embedded in weapon systems versus strategic operational and administrative telecommunications capital expenditures.

TABLE 2

BREAKDOWN OF OPERATIONAL TELECOMMUNICATIONS EXPENDITURES FOR 1980/81 AND 1981/82

EAR	SERVICE		($) 02 OPERATIONAL TELECOMMUNICATIONS EXPENDITURES ($000)	(%) DISTRIBUTION OF 02 EXPENDITURES	($) 02 OPERATIONAL TELECOM. EXP. RECOVERED BY GTA ($000)	(%) DIST. OF COSTS RECOVERED BY GTA	(%) OF TOTAL 02 RECOVERED BY GTA
1981/82	VOICE	INTERCITY	88,043	37.9	57,741	81.0	65.6
		LOCAL SERVICES	81,595	35.1	3,376	4.7	4.1
	DATA	INTERCITY	35,411	15.2	10,211	14.3	28.8
		LOCAL SERVICES	27,374	11.8	0	0	0
	TOTALS		232,423	100.0	71,328	100.0	30.7
1980/81	VOICE	INTERCITY	69,968	40.2	45,299	80.5	64.7
		LOCAL SERVICES	47,864	27.5	2,742	4.9	5.7
	DATA	INTERCITY	39,683	22.8	8,244	14.6	20.8
		LOCAL SERVICES	16,535	9.5	0	0	0
	TOTALS		174,050	100.0	56,285	100.0	32.4

TABLE 3

TOTAL TELECOM EXPENDITURES (INCLUDING SALARIES)

DEPARTMENT / AGENCY	1981/82 TOTAL TELECOM. (INCL. SALARIES) ($000)	% OF TOTAL	1980/81 TOTAL TELECOM. (INCL. SALARIES) ($000)	% CHANGE 1981/82 COMPARED TO 1980/81
NATIONAL DEFENCE*	135,680	30.2	135,049	0.5
ROYAL CANADIAN MOUNTED POLICE	83,687	18.6	65,236	28.3
EMPLOYMENT & IMMIGRATION	29,686	6.6	30,146	- 1.5
TRANSPORT CANADA	29,558	6.6	22,415	31.9
EXTERNAL AFFAIRS	23,269	5.2	19,498	19.3
REVENUE CANADA - TAXATION	11,673	2.6	10,044	16.2
HEALTH & WELFARE	7,462	1.7	5,974	24.9
SUPPLY & SERVICES - SERVICES	7,029	1.6	5,614	25.2
FISHERIES & OCEANS	6,927	1.5	N/A	N/A
COMMUNICATIONS	6,149	1.4	7,330	-16.1
INDIAN & NORTHERN AFFAIRS	5,884	1.3	5,252	12.0
AGRICULTURE CANADA	5,849	1.3	4,131	41.6
REGIONAL INDUSTRIAL EXPANSION**	5,020	1.1	5,480	0.8
ENERGY, MINES & RESOURCES	4,972	1.1	N/A	N/A
REVENUE CANADA - CUSTOMS & EXCISE	4,913	1.1	4,221	16.4
CORRECTIONAL SERVICES	4,726	1.1	4,301	9.9
STATISTICS CANADA	3,755	.8	2,013	86.5
PUBLIC SERVICE COMMISSION	2,891	.6	2,552	13.3
SECRETARY OF STATE	2,867	.6	2,383	20.3
VETERANS AFFAIRS	2,779	.6	2,093	32.8
NATIONAL RESEARCH COUNCIL	1,802	.4	1,553	16.0
CONSUMER & CORPORATE AFFAIRS	1,756	.4	1,255	39.9
NATIONAL MUSEUMS	1,704	.4	1,246	36.8
JUSTICE	1,567	.3	1,141	37.3
NATIONAL FILM BOARD	1,225	.3	1,207	1.5
CANADIAN INTERNATIONAL DEVELOPMENT AGENCY	1,053	.2	908	16.0
FINANCE	843	.2	712	18.4
PRIVY COUNCIL	832	.2	796	4.5
CANADIAN TRANSPORT COMMISSION	810	.2	693	16.9
TREASURY BOARD	802	.2	571	40.5
LABOUR	801	.2	597	34.2
AUDITOR GENERAL	725	.2	499	45.3
PUBLIC ARCHIVES	725	.2	341	112.6
CANADIAN RADIO-TELEVISION & TELECOMMUNICATIONS COMMISSION	437	.1	371	17.8
NATIONAL ENERGY BOARD	427	.1	446	- 4.3
SOLICITOR GENERAL	408	.1	N/A	N/A
NATIONAL PAROLE BOARD	378	.1	220	71.8
ECONOMIC DEVELOPMENT	240	.1	181	32.6
NORTHERN PIPELINE AGENCY	207		156	32.7
ATOMIC ENERGY	176		138	27.5
COMMISSIONER OFFICIAL LANGUAGES	176		111	58.6
SCIENCE & TECHNOLOGY	153		170	-10.0
PUBLIC SERVICE STAFF RELATIONS	140		119	17.6
ECONOMIC COUNCIL OF CANADA	128		118	8.5
MINISTRY OF STATE FOR SOCIAL DEVELOPMENT	125		N/A	N/A
FITNESS & AMATEUR SPORTS	121		N/A	N/A
SOCIAL SCIENCES & HUMANITIES RESEARCH COUNCIL	119		N/A	N/A
CANADIAN HUMAN RIGHTS COMMISSION	104		124	-16.1
SCIENCE COUNCIL OF CANADA	101		103	- 1.9
INSURANCE	98		60	-63.3
IMMIGRATION APPEAL BOARD	91		97	6.2
CANADIAN INTERGOVERNMENTAL CONFERENCE BOARD	84		92	8.7
SUPREME COURT OF CANADA	72		72	0
CHIEF ELECTORAL OFFICER	67		376	-82.2
STATUS OF WOMEN	53		33	60.6
TARIFF BOARD	41		N/A	N/A
ENVIRONMENT CANADA	N/A		14,752	N/A
SUPPLY & SERVICES - SUPPLY	N/A		3,700	N/A
CANADA POST	N/A		5,831	N/A
PUBLIC WORKS	N/A		4,026	N/A
NATIONAL LIBRARY	N/A		438	N/A
COMMISSIONER FOR FEDERAL JUDICIAL AFFAIRS	N/A		171	N/A
CANADA LABOUR RELATIONS BOARD	N/A		104	N/A
TOTAL REPORTED	403,367	89.7	377,260	N/A
ADJUSTMENT FOR TOTAL GOVERNMENT REPRESENTATION	45,319	10.3	15,106	N/A
TOTAL GOVERNMENT TELECOM. EXP. (INCL. SALARIES)	449,686	100.0	392,366	14.6

* Adjustments have been made to the 1980/81 expenditures as a result of changes in methodology used by DND in the separation of telecommunications embedded in weapon systems versus strategic operational and administrative telecommunications capital expenditures.

** Regional Industrial Expansion was previously reported as the Departments of Industry, Trade and Commerce and Regional Economic Expansion.

TABLE 4
TELECOMMUNICATIONS PERSONNEL
1981/82

OCCUPATIONAL GROUP	MANAGERIAL	COORDINATION	EQUIPMENT OPERATION	ENGINEERING MAINTENANCE	ENGINEERING SUPPORT	1981-82 TOTAL
CR - Clerical & Regulatory	9.0	334.3	828.8	-	4.0	1176.1
CM - Communications	1.0	1.1	629.4	2.1	-	633.6
AS - Admin. Services	112.8	156.0	6.6	1.0	2.0	278.4
EL - Electronics	8.0	-	-	186.2	6.0	200.2
OTHER	.5	3.6	122.2	4.3	-	130.6
SCY - Secretarial	-	52.3	72.4	-	2.0	126.7
ST - Secretarial	9.0	43.3	49.0	-	-	101.3
GS - General Services	-	-	-	56.0	-	56.0
GL - Gen. Labour & Trade MAN	-	-	.8	38.0	-	38.8
ENG - Engineering	-	-	-	7.0	20.0	27.0
GES-MAN Messenger Service	-	22.0	-	-	-	22.0
CS - Computer Systems Admin.	6.5	10.1	-	-	1.5	18.1
OCE - Machine Operator	-	4.0	10.5	-	-	14.5
FI - Financial Admin.	4.0	5.0	-	-	-	9.0
DD - Drafting	-	-	-	-	9.0	9.0
PG - Purchasing & Supply	2.1	6.3	-	-	-	8.4
DA - Data Conversion	1.1	1.0	4.4	-	-	6.5
OM - Organization & Methods	2.0	1.0	-	-	2.0	5.0
EG - Engineering & Scientific	-	-	-	-	4.5	4.5
SI - Social Science Support	-	3.0	-	-	-	3.0
RO - Radio Operations	-	-	3.0	-	-	3.0
SM - Senior Management	1.2	-	-	-	-	1.2
EX - Executive	1.1	-	-	-	-	1.1
SX - Senior Executive	1.0	-	-	-	-	1.0
IS - Information Services	1.0	-	-	-	-	1.0
PSC TOTAL	160.3	643.0	1727.1	294.6	51.0	2876.0
UNIFORM	150.1	309.5	1399.1	590.0	93.0	2541.7
CIVILIAN	3.6	26.6	483.6	208.5	3.2	725.5
OTHER	-	-	955.7	2	-	957.7
TOTAL	314.0	979.1	4565.5	1095.1	147.2	7100.9

TABLE 5

TELECOMMUNICATIONS EXPENDITURES AND PERSON - YEAR FORECAST

YEAR	TOTAL TELECOM EXPENDITURES ($000)	TELECOM PERSON-YEARS REPORTED	FORE-CAST GROWTH %	TOTAL TELECOM PERSONNEL RELATED EXPENDITURES ($000)	TOTAL TELECOM EXPENDITURES (including Personnel Related Expenditures) ($000)
*** 1978/79	226,120	5,732		94,022	320,142
*** 1979/80	221,617	6,106		108,114	329,731
*** 1980/81	258,858	7,102		133,508	392,366
1981/82	302,250	7,101		147,436	449,686
1982/83	360,076	7,364	*3.7	162,065	522,141
1983/84	408,061	7,592	*3.1	175,443	**583,504
1984/85	463,105	7,843	*3.3	193,919	**657,024
1985/86	528,719	7,929	*1.1	209,776	**738,495
1986/87	604,119	8,032	*1.3	227,378	**831,497

* Forecast Growth of Telecom Person-Years provided by reporting departments

** Personnel Related Expenditures were forecast using Person-Years Growth Forecast and 6% for 1982/83
5% for 1983/84 and
7% for remaining years

*** Past years have been adjusted to a comparable 1981/82 base

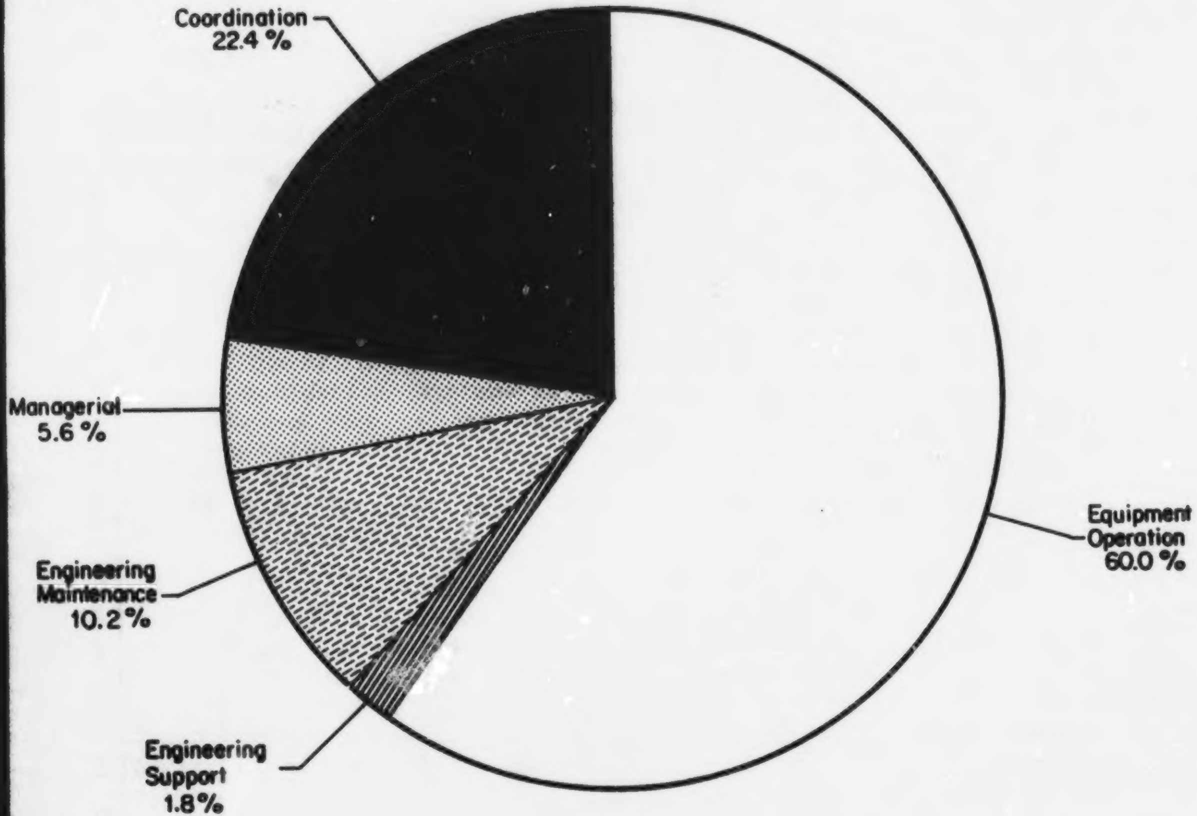
TABLE 6

SUMMARY OF FORECAST FOR TOTAL TELECOMMUNICATIONS EXPENDITURES

YEAR	TELECOM OPERATING EXPENDITURES ($000)	TELECOM OPERATING & CAPITAL EXPENDITURES ($000)	TELECOM OPERATING CAPITAL & PERSONNEL RELATED EXPENDITURES ($000)
1981/82	260,150	302,250	449,686
1982/83	294,157	360,076	522,141
1983/84	328,606	408,061	583,504
1984/85	367,334	463,105	657,024
1985/86	413,282	528,719	738,495
1986/87	464,978	604,119	831,497

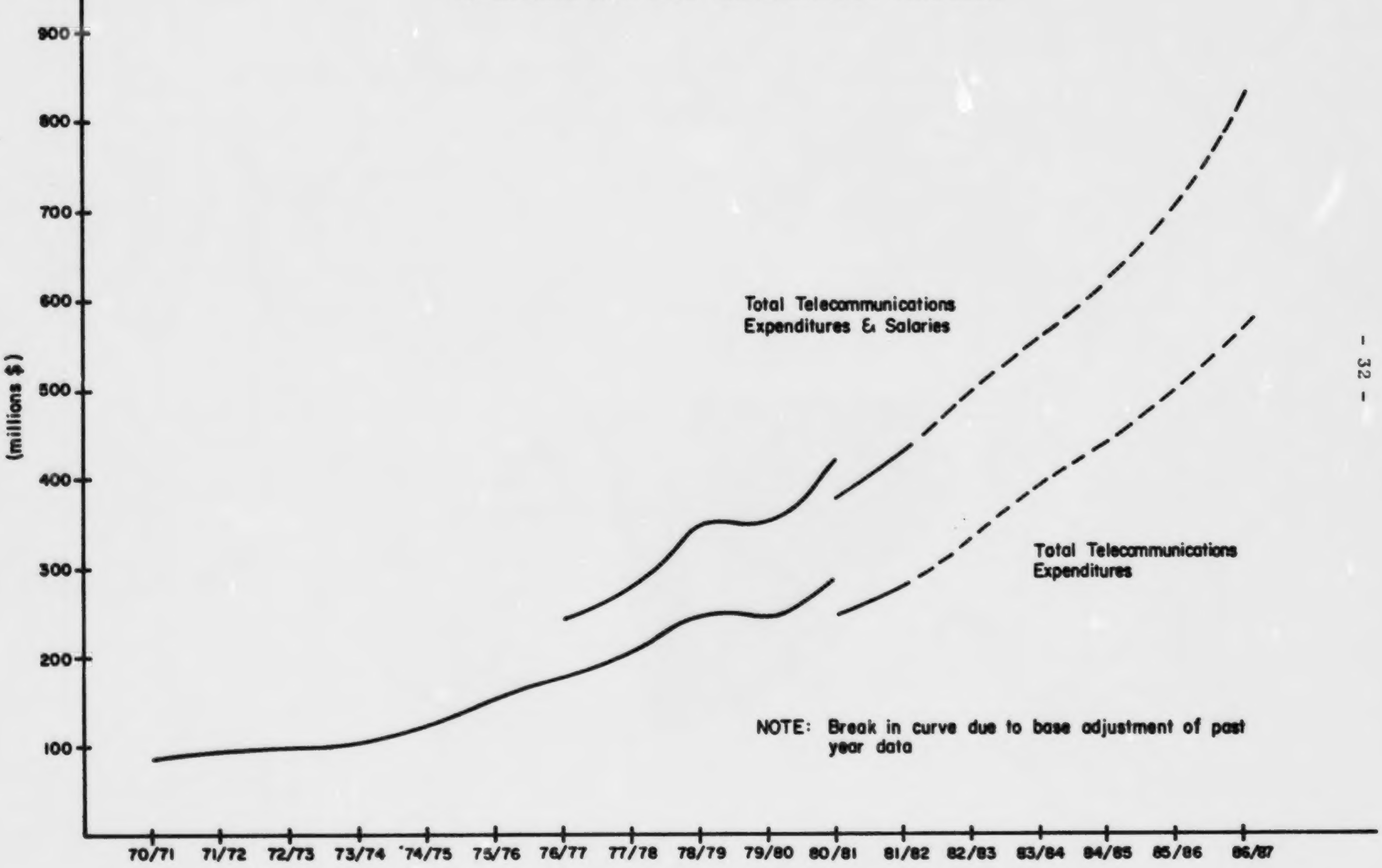
GRAPH 1

PERCENTAGE PUBLIC SERVICE TELECOMMUNICATION PERSONNEL EMPLOYED IN VARIOUS AREAS ACTIVITY 1981/82



GRAPH 2

TELECOMMUNICATIONS EXPENDITURES FORECAST



NOTE: Break in curve due to base adjustment of past year data

D. Preface to Long Range Planning Framework

1. Introduction

Only two years have passed since the potential impact of the electronic industries on the office was identified to planners in the Government. The 1979/80 Annual Review of Telecommunications, supported by an independent study (the Conceptual Definition), presented the initial guidance for Government office automation planning.

Last year this foundation was strengthened and advanced by the 1980/81 long range planning and administrative policy frameworks.

Now it is time to identify new trends, assess direction, and extend the planning framework.

At the second global Futures Conference held in New York in July, 1982, certain maxims were identified as historical trends in telecommunications.

Simply stated, they were:

1) Out of the total communications market, the telecommunications share constantly increases.

2) There is an increasing pervasiveness of telecommunications systems in the sense that more and more people have access to them (telephones, television, for example).

3) The integral cost of telecommunications constantly diminishes.

4) As new sources of telecommunications become available to the public and as these proliferate there always remains a use for those previously introduced. (The telephone did not replace the telegraph nor television, the radio).

These trends, which may be assumed to be perpetual, bear remembering as we plan for the future.

2. Office Automation Trends

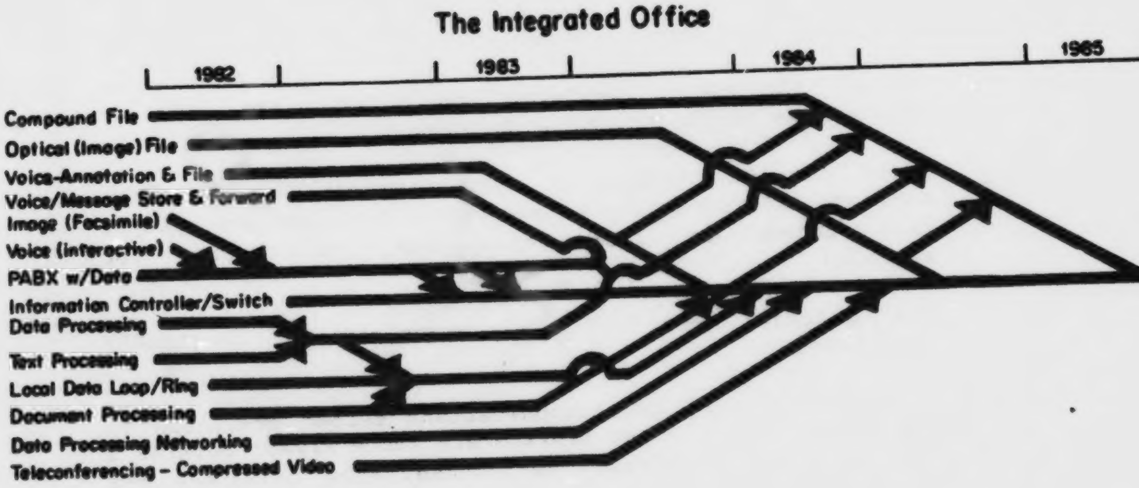
Looking at office automation trends, the speed of change is reshaping the predicted curve in some areas.

Late seventies futurists, for example, saw the paperless office as a reasonable goal. Now high-speed copiers and printers have delayed its advent and shattered its urgency.

Word processors - only a year ago synonymous with "the automated office" - have bowed to the more cost effective, more versatile personal or business computer.

System integration is moving at such a pace that in three years word processing, text, image and voice messaging will be indistinguishable and by 1985/86 all elements of information pertinent to the "compound file" will be available in a single desktop system. (See Figure 1, reprinted with the permission of The Business Planning Division of the Diebold Group, Inc.)

FIGURE 1


The Integrated Office
1982
1983
1984
1985
Compound File
Optical (Image) File
Voice-Annotation & File
Voice/Message Store & Forward
Image (Facsimile)
Voice (interactive)
PABX w/Data
Information Controller/Switch
Data Processing
Text Processing
Local Data Loop/Ring
Document Processing
Data Processing Networking
Teleconferencing - Compressed Video

The transfer of mainframe capability to the micro has brought about a shift in focus from support staff productivity to managerial thinking and analysis. This highlights the need for decision support software and exposes the fact that the system user is no longer exclusively (or even usually) an EDP specialist. With the advent of multi-user availability, search requirements now outnumber computation at a ratio of approximately 4:1.

Planners should specifically be advised to heed the trend in micro processors to perform a variety of functions efficiently at decreasing costs. Independent word processors are no longer a cost-effective doorway to office automation. They should be considered for specialized applications only and, even then, leased rather than purchased. Third generation micros, with even greater functionality, ease of use, compatibility and growth path possibilities will be introduced in the mid '80s. Managers, however, are advised to fill their needs now and upgrade later. By learning on what is available, users will know how to operate the new generation equipment to its fullest advantage.

It is reassuring to know that indicators continue to support the validity of pursuing the media switch/test bed approach advocated three years ago by the Annual Review. (For a list of pilot projects initiated by departments, please refer to Section F 2.3.2.)

Nevertheless, managers may well be asking how Government departments can proceed, given confined budgetary manoeuvrability.

Appropriately, the theme of the 1982 Federal Office Automation Conference in Washington was "Leveraging Resources through Office Automation". "Faced with major budget cuts and personnel limitations," delegates were told, "Federal office administrators must seek ways to improve workforce productivity at all levels. Office automation can help if implemented in a prudent and cost-effective manner that takes account of users' needs and concerns".

The message, which applies equally to Canadian federal administrators, was to proceed, assured of more than adequate long term benefits - not haphazardly or without caution, but carefully extending implementation over a wide enough timeframe to disseminate costs at a budget-sensitive rate. Productivity gains are no longer restricted to the support staff. Studies have now proven that automated systems can improve the productivity of professionals performing professional tasks by as much as 30 per cent.

In December, 1982 the Comptroller General of Canada encouraged the pursuit of office automation. "While there may be no natural profit or cost reduction incentives to implement office automation in the Government of Canada," he told DOC planners, "the deficit facing us is in itself an incentive. New areas of need are arising and Government departments will be faced with the requirement to reallocate resources. Office automation, well understood, well implemented and well utilized, offers solutions."

E. Government Objectives and Priorities

Restraint, equity and economic renewal formed the framework of Government objectives expressed in the November, 1981 Federal Budget. With expenditures to be reduced from 20.6 per cent of gross national product (GNP) in 1981/82 to 19.2 per cent in 1985/86, priorities were identified as expanded world markets, massive resource projects involving major expansion in manufacturing and transportation, and a new industrial revolution based on high technology.

In its total capacity high technology accounts for a substantial portion of GNP, thus rendering itself literally indispensable to the economic development of the country. In a very real sense the related industries can make a major contribution to the potential achievement of all three stated Budget objectives.

Restraint, for instance, will be addressed in part through improved productivity achievable via new electronic products and services. Equity is continually being strengthened by the improvement and higher standards in communications in rural, northern and other remote areas; and economic renewal will be bolstered if Canada remains competitive in new telecommunications-based technologies and services and the technologies are applied to other areas of production.

In The Innisbrook Papers, published by Northern Telecom Limited following the October 1981 conference, Richard J. Schultz explained the importance of telecommunications systems to public policies:

> "As the 'nervous systems of society', telecommunications systems will be seen not only as central to the social and economic infrastructure, but as the vehicles for attaining a broad range of public policies. Thus telecommunications systems, like railway systems in the past, and more recently energy systems, will be designated as chosen instruments to be utilized for the pursuit not only of traditional goals, such as inter-regional and inter-group income distribution, but of goals bearing on such issues as regional development, industrial development, technological sovereignty, unemployment, productivity and foreign investment...".

Federal Government priority in the high technology region was reinforced by Cabinet following the Budget. In January, 1982 the Cabinet Committee on Economic and Regional Development issued guidelines to departments for preparing proposals relating to microelectronics and information technology.

The guidelines focussed on the applications of these technologies as a means of improving productivity and competitiveness in traded goods and services, and recognized the need for government-industry cooperation in developing new applications.

On the same theme the following June $12 million was allocated for field trial expenditures under the Office Communications Systems (OCS) Program established in 1980 in response to the growing trade deficit in the Canadian office equipment and services sector. The Program's intention is to help Canadian companies develop the industrial capacity to supply the growing national and international markets for integrated office products and services.

One of the major objectives of the Government has been to develop Canadian industrial capacity by the transfer of developed technologies to the private sector. Under the Telidon Industry Investment Stimulation Program $10.5 million was released in 1981 and 1982 to Canadian firms which undertook to build 6000 Telidon terminals to be made available for use in new Telidon systems operated by the private sector.

F. Progress

1. Telecommunications Administrative Policy

1.1 Telecommunications Management Manual

The Telecommunications Management Manual, developed by the Government Telecommunications Agency in conjunction with the Telecommunications Advisory Committee, was distributed to all Government departmental Telecommunications Coordinators in September, 1982.

The manual is intended as an aid to departmental telecommunications functions. Telecommunications Coordinators were encouraged to disseminate the information contained in the manual to all telecommunications personnel within their department. This manual should become a useful tool for other employees in familiarizing themselves with all aspects of Government telecommunications management.

1.2 Common Services Policy

September, 1982 saw the publication by Treasury Board Canada of Administrative Policy Manual Chapter 303 - Common Services. Stating that it is the policy of the Government to provide goods and services through common service organizations, Chapter 303 directs departments and agencies to obtain their goods exclusively through those organizations identified. Exemptions may only be authorized by the Treasury Board.

The common services policy is intended to resolve the perceived uncertainties which seem to have developed over time concerning the roles, goals and accountability of common service organizations.

1.3 Telecommunications Training Syllabus

GTA issued a Telecommunications Training Syllabus to assist departments in the development of telecommunications personnel. The course selection seeks to assist departments in addressing the needs of Telecommunications Co-ordinators and officers within the Government of Canada, as identified in the Report on Telecommunications Training and Needs Identification and by Co-ordinators at the annual DOC/GTA seminars.

The Syllabus does not provide exhaustive listings for Canadian training and only a sampling of U.S. training is included. Ongoing input from telecommunications personnel will maximize the utility of the Syllabus. Input such as evaluation of training received will enable GTA to provide a general rating of the relevance of specific courses to Government telecommunications personnel. Factors such as depth and clarity of instruction, as well as subsequent value in the workplace, might be included.

GTA will continue to co-ordinate information such as requests for courses and courses available. The Syllabus will be updated on a regular basis. Here, too, Government telecommunications personnel who have attended or are aware of training not listed in the Syllabus are requested to forward the particulars for inclusion in its next publication. This cooperative effort will help insure the success of the Syllabus and its continued relevance to Government telecommunications personnel.

1.4 New Universal Call Code System

In a continuing effort to improve the call code system a new universal call code system will be introduced by GTA in the final quarter of 1983.

The new system will eliminate the two present systems - national eight character call codes and regional five digit call codes - and replace them with national eight digit call codes. This choice is seen as a method of providing a block of numbers sufficiently large to cover all requirements which will be adaptable to the auto-verification requirements of the new digital switches planned for consolidations across Canada.

Anticipated benefits of the new system include:

- elimination of confusion over which call code for what routing;
- reduced likelihood of abuse;
- compatibility with auto-verification on digital switches
- enhanced confidentiality for greater user confidence

2. Planning

2.1 Government Telecommunications Development Program

Changes in technology are having and will continue to have a significant impact on Government telecommunications operations - changes such as the introduction of digital technology through the initiation of Government-wide teletex (e.g. CWP), other areas of office communications/automation, the use of satellite technology and the development of integrated services and networks. Of equal significant is the impact of regulatory changes concerning interconnection and terminal attachment.

DOC's response to this in terms of planning strategy is to introduce new innovative applications and services to the Government:

- using to the greatest extent possible existing Government resources where incremental costs would be justified by incremental benefits derived;
- keeping pace with the technology development of the national industry; and
- ultimately establishing the capability of interconnection between any Government office and the national telecommunications systems.

The following summarizes GTA's strategic plans.

2.1.1 Voice Services

The modernization of the Government telephone network is being performed on a consolidation-by-consolidation basis, each consolidation providing local Customer Unit or Central Office centrex type services plus network features such as dial tandeming, automatic route selection, electronic switched network, etc. Planning for the enhancement of the present Government private network is proceeding in two areas, namely:

i) Modernization of the local consolidations in various cities.

ii) Modernization of the intercity (IX) telephone network.

For the local consolidations activities planned are:

- Introduction of Enhanced Exchange Wide Dial (EEWD) Bell Canada "Centrex" service for Ottawa/Hull (1983/84).
- Planning on a consolidation-by-consolidation basis:
  - to delineate user requirements and profile best served by Centrex or PABX;
  - to plan for the implementation of a proper mix of Centrex and interconnected PABX within a local region.
- Introduction of rational trunking and pricing policy for interconnection of PABXs to existing and planned consolidations for access to intercity network.

- Introduction of digital switches in other consolidations (dependent on the common carrier construction program for modernizing existing Centrex and Exchange Wide Dial services).

In areas where regulatory conditions permit terminal attachment, the competitive process involving the telephone company and other qualified suppliers will be investigated. The process will involve a Treasury Board submission to obtain approval of the necessary funding, if required.

In all cases a standard uniform national specification is generally used with some adjustments possible for specific regional needs.

To date plans call for the installation of digital switches at the following locations:

a) Vancouver/Victoria

The lack of equipment spares and capacity to respond to meet the additional user requirements have prompted the British Columbia Telephone Company to propose an enhanced telephone service for Vancouver/Victoria to be available mid-1984 which would ensure continuity of service and provide modern features at a cost comparable to the existing service. While it is envisaged that the consolidation will be upgraded along this proposal, GTA is proceeding with a project that will permit competitive offers from suppliers.

b) Calgary

Alberta Government Telephone plans to provide the federal Government users in Calgary with an enhanced Centrex service based on DMS 100/200 technology. Terms, conditions and schedule are unknown at the time of writing.

c) Winnipeg

The Manitoba Telephone Systems decided to replace the current telephone service provided to the federal and provincial Governments in Winnipeg with a modern DMS-based city-wide Centrex service by mid-1983. Impact on cost is unknown at the time of writing.

d) Toronto, Montreal, Hamilton, Quebec City

In 1982 Bell Canada was testing the enhanced DMS-based city-wide Centrex called CENTREX 3 and planned to offer it to governments and industry in Toronto, Montreal and Quebec City. Proposals are pending from Bell Canada.

e) Saskatoon

Saskatchewan Telecommunications (Sask Tel.) plans to offer a DMS-based Centrex service to federal departments in Saskatoon.

f) Other

Proposals are expected from the various telephone companies in the Atlantic provinces to modernize existing telephone services with new DMS or SL-1 equipment.

The timeframes when proposals are expected for the following locations are:

Halifax, N.S.	1984
Fredericton, N.B.	1984
Moncton, N.B.	1984/85
Saint John, N.B.	1984/85
St. John's, Nfld.	1984/85

New Consolidations

A systematic review of requirements is underway to provide cost effective local telephone services based on the new technology developments and the changing regulatory environment for PBX/PABX installations.

The following locations have been identified as potential new consolidations:

Sydney	N.S.	(proposal expected December, 1982)
Sept-Iles	Qué.	
Thunder Bay	Ont.	
Brandon	Man.	
Penticton	B.C.	
Gander	Nfld.	(proposal expected 1985)
Corner Brook	Nfld.	(proposal expected third quarter of 1983)

For the Inter-city (IX) Network, the activities envisaged are:

- Examining the implications and feasibility of replacing some existing inter-city tie trunks between consolidations with direct tie trunks between user premises-located PBXs.
- Planning for the introduction of satellite communications into the existing government network for thin route communications and communication between urban centres.

The inter-city portion of the network will be optimized as the network enhancement features become available at each consolidation

2.1.2 Government Satellite Communications Network Service

Satellite communications, with its many unique characteristics, will make available fully integrated, digitally-encoded voice and data as well as video services directly to user premises. Variable bit rates from low to very high make the facilities flexible to accommodate widely varying application requirements. Technologies employing Single Channel Per Carrier (SCPC), Time Division Multiple Access (TDMA) and Demand Assignment Multiple Access (DAMA) make satellite-based communications economically attractive for services to low traffic and widely dispersed locations.

The introduction of satellites into the Government networks will be a gradual process. Elements of the strategic plans for satellite communications may be summarized as follows:

- Development of satellite technology and technical expertise through experimental field trials in co-operation with industry and federal departments.
- Selection of the most viable Government applications which could be cost-effectively supported by a satellite system.
- Development of user-specific satellite systems to meet departmental operational needs.
- Gradual introduction of satellite communications to extend the capability of the shared Government-wide terrestrial network and achieve better utilization of resources, lower cost facilities and more cost effective services.

Specifically, the development plan will call for:

- Gradual introduction of satellite communications as the basis for an all-digital integrated (voice, data, image) Government-wide network.
- Facilities which permit sharing.
- Use of SCPC technology (for thin route and low traffic communications between geographically dispersed locations in situations not economical for TDMA).

- Use of TDMA technology in cases when dynamic assignment of traffic capacity among stations is cost effective.
- Use of 14/12 GHz satellite technology to provide rooftop-to-rooftop communications.

2.1.3 Government Enhanced Teleconferencing Service

Interest and prioritization for the development and improvement of teleconferencing capabilities in the Government come from the realization that:

- the benefits of teleconferencing are obvious in a climate hard-pressed to contain rising costs such as travel expenses and to increase managerial productivity; and
- the current technology on teleconferencing has now matured to the point that it offers unique opportunities for increased cost effectiveness and productivity.

Moreover, in light of the Government guidelines on reduction of travel within the public sector, GTA is formulating plans for the development of a Government-wide enhanced teleconferencing service.

The plan for the development of enhanced teleconferencing capabilities in the Government during the years 1982-1986 includes:

- Introduction of improved audio teleconferencing on user-arranged "meet-me" basis, but retaining the option of operator assisted basis.
- Assessment of plans for the introduction of regional teleconferencing centres.
- Introduction of graphical presentation aides using the application of Telidon, slow-scan TV and other techniques.
- Introduction of point-to-multi-point one-way limited (or full) video capabilities.
- Assessment of plans for the introduction of computer teleconferencing and two-way full video teleconferencing.

2.1.4 Government Electronic Messaging Service

The applications of telecommunications in the form of Electronic Messaging Systems (EMS) represents the fastest growing group of services having the greatest potential for long term impact on Government office communications. It encompasses the following types of service:

i) Telematic Services
ii) Computer Based Messaging Systems (CBMS)
iii) Voice Messaging Systems

Telematic services are 'CCITT' defined telecommunications services encompassing Telex, Teletex, Facsimile and Videotex. Each of these services offers messaging capabilities for their users, although messaging is not the principle service for Videotex. Within these telematic services, "teletex" is a standard communications protocol for text communications equipment such as communicating word processors, intelligent typewriters, etc. It facilitates transfer of electronic files among previously incompatible machines. Designed as a replacement for teletype traffic, teletex is highly automated. To send a message all the user has to do is to type in the recipient's address and the system will perform all communications functions.

Competing with teletex is another technology, Computer-Based Message Systems (CBMS), which can provide additional capabilities to teletex; e.g., store and forward; multiple addressing. CBMS supports a wide variety of terminals such as non-intelligent ASCII devices.

The introduction of EMS applications into the Government will be pursued on a number of fronts with the longer term objective of integrating the individual services into a single universal service. Initially, therefore, the approach is to evaluate each service in the EMS family to determine its technical and economic characteristics and its perceived role in the Government organization.

The stages for the planning and development of Government office communications are summarized as follows:

a) Development of Government "Telematic" Application/Services

Stage I (1982 - 1986)

- Development of Government network of CWPs.
- Development of techniques for interworking of dissimilar CWPs, particularly with respect to resolving protocol incompatibilities.

- Development of Government Teletex service based on use of federal standard on teletex.
- Development of videotex services for Government application.
- Evaluation of evolution of facsimile technology and services in the Government.

Stage II (1983 - 1984)

- Development of inter-working of GDNS (Telex), Government Teletex and other similar services (Infotex, Envoy 100).

b) Development of Government "CBMS" Services (1982 - 1986)

- Government-wide electronic mail service.
- Standardization of communications protocols based on the Message Handling System (MHS) model.
- Evaluation and development of procedures for inter-working of departmental private CBMS systems.

c) Development of future Government EMS applications (1986 and beyond)

- Integration of Government telecommunications services.
- Development of Government facility to inter-work Government telematic systems with Government CBMS.

Service Development Plan (1983/84)

The following Electronic Messaging Systems are planned to be introduced by GTA in 1983/84 to its client departments:

1) Based on the evaluation of user demand and the cost effectiveness of electronic mail systems, GTA introduced in the fall of 1982 a Government Electronic Mail Service (GEMS) trial utilizing a common carrier-provided service, the Trans Canada Telephone System (TCTS) Envoy 100, on a Government-wide bulk purchase basis. In 1983/84 GTA will also investigate the feasibility of alternatives, including the use of Government-owned computer-based messaging systems.

2) As a first step in the development of a Government 'teletex' (text communications) service, GTA plans to organize a Government-wide application of communicating word processors (CWPs). Planning will address interworking of dissimilar CWPs with respect to resolving incompatibilities. Development of a Government teletex service will be based on the adoption of international and national standards on teletex as federal standards.

2.1.5 EDP Communications

The group of services covered by the term "EDP communications" include:

- Interactive systems for data entry, update and retrieval in real time involving communication between a terminal and a central computer facility.
- Computer-to-computer systems used for data file transfer applications.

In most instances the EDP applications are specialized in the sense that they are specific to each user group and incorporate requirements that are essentially unique to that group. They also rely heavily on the computer vendors' protocols and network architectures. For these the principal communications needs are point-to-point and point-to-multi-point data transmission facilities operating in the medium to high bit rate range (2.4 - 56k bps), although lower bit rates (300-1200 bps) are still widely used.

It is envisaged that, in the near future at least, the EDP communications requirements of the Government will continue to be provided by the common carriers through their existing networks.

The immediate planning strategy is to review the opportunity for the Government to consolidate Government data (EDP) communications requirements in a manner

- that for appropriate EDP applications (dedicated and circuit switched data services) could be replaced by distance insensitive packet switched network services; and
- in which tariff benefits could be derived due to bulk procurement and central network service management.

In the longer term, however, when the Government private network becomes digital on a widespread basis, the ability of the network to support medium and high speed data communications in a cost effective manner will improve markedly. Also, the potential application of satellite communications within the Government will bring with it a wideband data capability which would prove attractive for many applications.

2.1.6 Shared Data/Messaging Services

An alternative consideration being given in the planning and development of Government EDP and office communications is the possibility to provide a shared network facility which could support both data and electronic messaging applications of the participating user departments.

In April, 1982 a project was initiated to investigate the feasibility of combining data communications facilities in several Government departments with a view to determining the practicality and viability of a shared data network. The study is also intended to address the increasing trend in the individual departments to integrate new office communications applications into existing departmental networks supporting mainly EDP applications.

Through the analysis of user needs on data, facsimile, text and messaging communications and the availability of products and services, the project will address the following areas:

a) the consolidation of user department data communication networks; and

b) the feasibility of a Government-wide store and forward message and electronic mail network, including the modernization of the Government Data Network Service (GDNS).

2.1.7 Government Local Area Networks

A Local Area Network (LAN) is a data communications system for interconnecting a number of data handling devices on a common transmission medium. The distance over which it operates ranges from a few metres to several kilometres (typically 1 km), and the area served is usually a floor of a building, a complete building or a cluster of buildings confined to a limited geographic area. The LAN is almost always owned or used by a single organization.

The application of LAN in the Government, as planned by GTA, will essentially support user requirements for EDP communications and office communications.

The development plan to be established will deal with cost effective CBX/LAN alternatives for office communications, including voice.

2.2 Activities

2.2.1 Government Telecommunications Agency

The environment of evolving advanced technology and regulatory changes surrounding GTA is flavoured by increasing Government information requirements. Current activities of the Agency support Government emphasis on office automation in the areas of electronic messaging, teleconferencing, rooftop-to-rooftop satellite communications, evolution of local and inter-city networks and the development of an integrated services digital network. Some recently implemented and other ongoing management improvement projects of the Agency have accounted for major economic benefits to the Government. These are reported in Section B 3.

2.2.1.1 Trial Project Activities

The Government Telecommunications Agency has recently completed or is currently involved in several pilot trials of innovative telecommunications services and applications which have been made possible by technological advances and regulatory changes.

The major areas in which these trials are concentrated are electronic messaging and satellite communications. In the area of electronic messaging, trials have been conducted of both text messaging (DOC CWP Network Pilot Trial) and personal messaging (ENVOY 100) applications.

In the area of satellite communications GTA is presently involved with CNCP on a trial of the SLIM TDMA system which was jointly developed by DOC and CNCP. A second TDMA trial is planned for early 1983 with TCTS. This trial is a forerunner of the TCTS Integrated Satellite Business Network (ISBN) service which has been announced to start in late 1983.

A) Satellite Trials

The satellite telecommunications trials were undertaken in order to evaluate and demonstrate to user departments the unique attributes of satellite systems which could lead to new efficient and cost-effective intra-government communications. The principal objectives of these trials are to:

- evaluate the applicability and opportunity for use of state-of-the-art satellite technology in Government operations, and
- stimulate the development of Canadian satellite communications.

The two trials sponsored by GTA are:

i) ANIK-B Federal Government Telecommunications Field Trial

This trial, which was announced on June 18, 1981 by the Minister of Communications, provides communication services among the offices of three federal departments using the 14/12GHz portion of the ANIK-B satellite and TIME DIVISION MULTIPLE ACCESS (TDMA) technology jointly developed by DOC and CNCP and built by Miller Communications Systems Ltd. In addition to GTA's applications, the network serves those of the Canada Employment and Immigration Commission and the Atmospheric Environment Service of Environment Canada.

The network also employs Single Channel Per Carrier (SCPC) technology. The SCPC technology is well suited to provide service to low traffic volume locations while the TDMA technology, which integrates the transmission of voice, data, and video signals to enable the more efficient use of channel capacity, is better suited to locations having higher traffic volumes. The network operates in a "rooftop-to-rooftop" configuration with several of the earth stations located on user premises. TDMA earth stations are located in Ottawa, Toronto, Montreal, and Bathurst, New Brunswick while SCPC earth stations are located in Ottawa, Newmarket, Ontario, and Frobisher Bay, North West Territories.

The applications were phased in during the period May to October, 1982. The trial was completed in February, 1983.

ii) TCTS/TDMA Satellite Communications Trial

A second satellite communications trial, to be carried out by GTA jointly with the Computer Communications Group of the Trans Canada Telephone System, was announced by the Minister of Communications on December 2, 1981. This four-month trial, also using TDMA earth stations operating in a rooftop--to-rooftop configuration, will take place early in 1983 and serve as a service trial for the Integrated Satellite Business Network (ISBN) service offering announced to commence in the latter part of that year. In addition to the federal Government, the Bank of Nova Scotia and Dome Petroleum are also participating in this trial. GTA's client departments will be National Health and Welfare, Revenue Canada-Taxation, and the Atmospheric Environment Service of Environment Canada. Earth stations will be located in Halifax, Toronto, Calgary, and Ottawa. The Ottawa earth station shared by all participating user departments will be located on the premises of National Health and Welfare at Tunney's Pasture. The other earth stations will be located on the premises of other user organizations or TCTS.

Outcome of Satellite Trials

As these trial projects are still in progress, it is premature to draw any firm conclusions at this time. From the perspective of GTA, the experience and knowledge gained from these trials will form the basis of its decision on the development and introduction of a shared satellite network service to meet the needs of federal Government departments. The trials also provide an opportunity to demonstrate the potential benefits of satellite services to client departments. From a wider perspective, these projects complement the work of the DOC Space Sector to enhance Canadian capabilities in satellite communications. The trial projects have influenced and will continue to influence the development of Canadian satellite communication services and related industries.

B) Electronic Messaging Trials

In the area of electronic messaging, trials have been carried out or are underway to support the planning for an orderly introduction of electronic messaging applications and shared services in the federal Government. The trials were undertaken to examine both the technical and behavioural implications involved in the introduction of these systems.

The objectives of the continuing work in this area are:

(a) to establish cost effective electronic text communications capabilities and applications in the Government;

(b) to identify technical and behavioural ramifications in the implementation of electronic text communications network services;

(c) to identify those user applications most suitably served by an electronic text communications network and to develop user guidelines for orderly introduction of these applications; and

(d) to enhance DOC's capacity to be at the leading edge in the implementation of information technology innovations.

i) Government Text Communications Pilot Trial

As the first step in the development of a government-wide text communications (teletex) service, early in 1982 GTA spearheaded the establishment of a communicating word processor (CWP) network within the Department of Communications.

Communication between CWPs was carried out using the federal Government Inter-city Telephone Network. The CWP network, initially managed by GTA on a trial basis, is now fully operational and management has been transferred to the Division of Administrative and Technical Services of DOC. At the conclusion of the trial phase in March 1982 the network linked all six DOC regional offices and five headquarters offices.

In addition to examining the technical, economic, and operational issues for such a network, some behavioural concerns were also addressed.

Among the technical issues under study are communications between dissimilar word processors, the use of word processors with computer-based messaging systems and public data networks, the use of protocol convertors, and the use of encryption techniques.

During the fall of 1981 GTA consulted with 15 federal Government departments to determine their requirements for electronic text communications services. Of these, 12 departments expressed an interest in participating in a Government-wide text communications trial service. As a result of the identified need, GTA is engaged in development activities to implement such a service.

ii) Envoy 100 Trial

Envoy 100 is a personal store-and-forward messaging service introduced in the fall of 1981 by the Computer Communications Group of the Trans-Canada Telephone System. To evaluate this service GTA instituted an in-house trial lasting three-to-four months. The service was implemented as a general communications vehicle, to be used for whatever application that trial user thought would be effective. The objective of the trial was to assess ENVOY 100 in terms of its practicality and cost effectiveness as a potential shared message service option in the federal Government.

The trial was evaluated both in terms of equipment and communications cost and in terms of benefit through increased productivity. The findings were that the service resulted in an increase in productivity the value of which was roughly equal to the increased costs incurred. As a result of this trial, GTA has instituted the Government Electronic Message Service (GEMS) which provides ENVOY 100 service on a shared Government-wide basis. GEMS is currently offered on a trial basis.

2.2.1.2 Modernization of Telecommunications Switching Facilities

The Government telephone network consists of over 20 consolidations (all major cities), the largest being Ottawa-Hull with about 82,000 telephones and the Government of Canada switchboard, served by some 120 operators. Ottawa-Hull also serves as the hub of the Government Inter-city Network. It is, however, based on obsolete technology that precipitated users' complaints as to quality of service and availability of features. Further shortcomings characterize the Vancouver consolidation, comprising 6,000 telephones. These two consolidations represent priority items for modernization.

Ottawa/Hull

An agreement has been negotiated between Bell Canada and GTA to upgrade the Ottawa-Hull consolidation with the installation of a modern digital city-wide centrex service (based on the Northern Telecom SL-100 switch).

The enhanced digital centrex service will provide modern station features such as call transfer, conference three-party, call forward all calls, no answer, busy, call waiting, call pickup, touchtone, do not disturb, etc..., push button activated feature sets, modern electronic operator consoles, complete and accurate Station Message Detail Recording and, in some cases, realtime validation and recording of authorization codes input by the operator or directly entered by the caller using the Direct Inward System Access feature. In addition, modern network services such as dial tandeming and automatic selection of the most economical long distance route are also available.

These features make possible more cost effective telephone configurations, a more efficient inter-city network routing, a higher portion of calls originated and answered without operator or secretarial intervention, a better control of telecommunication expenditures because of complete, accurate call detail recording and toll restriction capabilities per station per route and type of long distance facilities.

As the interim CRTC decision to allow attachment of certified terminals to common carrier facilities and networks allows terminal attachment suppliers to compete for the provisions of the Government telephone service in Ottawa-Hull, various alternatives were considered for the provisioning of the service.

Following careful analysis of the equipment availability and capabilities of various terminal attachment suppliers, and the added length of time which would be required to modernize the

Ottawa-Hull consolidation on a competitive basis, it was concluded that it would be in the best interest of the federal Government to accept the new enhanced service offered by Bell Canada.

GTA negotiated with Bell for this service under tariffs without long term contract commitments that will permit the flexibility to continue with Bell as long as the service meets the requirements in a cost effective manner. Subsequently, GTA received approval from Treasury Board to subscribe to the Enhanced Exchange Wide Dial (EEWD) service offered by Bell Canada which is scheduled to be available in September, 1984. Negotiations also include training plans to cover a period from April '83 to March '85.

The termination of the existing inter-city circuits to the new service and the modernization of the consolidation operator service is scheduled to take place December, 1983. The existing telephone lines (main lines) are scheduled to be cutover to the new service systematically, on a switch-by-switch basis starting in January '84 and ending in September '84. During this cutover phase, the user will perceive a better transmission quality, better station features and a substantially faster and more efficient consolidation operator service. However, increased post dialling delay will be experienced owing to the operating characteristics of the new service. After the cutover phase, the users will have the opportunity to request changes in their telephone configurations. In addition, rotary dial will be replaced at no charge by identical type touch tone. The reconfiguration phase is expected to last from February '84 to mid '85. Billing for the new service will start at the end of the cutover phase.

Vancouver/Victoria

(See para. 2.1.1.)

2.2.1.3 New Consolidations Created

In 1981/82 new consolidations were established in the following locations:

Kingston, Ontario

Local telephone services leased at Kingston, Ontario by 15 departments have been consolidated into a single system and administered by GTA to take advantage of economies of scale. This new consolidation, comprised of an X-BAR system with 350 main lines plus 52 trunk connections to five satellite systems, commenced operations on February 15, 1982.

Sudbury, Ontario

A consolidated telephone system consisting of 295 main lines plus 15 trunk line connections from satellite systems was established in November, 1981. The serving vehicle, an SP-1 unit, accommodated direct inter-city service lines to both Toronto and Ottawa, plus OUTWATS facilities to other area points. The new Revenue Canada - Taxation Data Centre is the primary user department.

Abbotsford, B.C.

A system utilizing an SL-1 unit was put in place at Abbotsford, B.C. and will serve as a telephone "hub" for Solicitor General operations in that area. This system is integrated with the consolidation at Vancouver in such a manner that all IX services are made available to the Abbotsford system users. It is possible to dial directly such users from other Government network locations that have direct dial access to Vancouver; e.g., Ottawa, Winnipeg, Calgary, etc.

Automatic call detail recording systems were implemented in the three new consolidations as well as in existing consolidations in Sherbrooke, Québec City, Montréal, Hamilton, London and North York (Toronto).

2.2.1.4 Intercity Services

A new tie trunk group between Vancouver and Toronto was installed in May, 1981. This group cutover included a total of six circuits.

The special series of transmission tests begun in 1980 was completed in 1981. Upon completion of these tests deviations on IX circuits have been corrected.

Owing to echo problems on Ottawa-Halifax tie trunks, this group has been permanently switched from satellite facilities to terrestrial facilities.

2.2.2 Departments and Agencies

2.2.2.1 Lexicon of Electronics and Telecommunications Terminology (DSS)

Non-uniformity in translation of telecommunications terms into French has become an increasing problem for the federal Government as the hi-tech vocabulary expands in step with the industry. To address this issue, in March, 1980 le Comité de normalisation de la Terminologie de l'Électronique et des Télécommunications was established. Affiliated with the International Society of Linguists and the International Telecommunications Union, it is composed of a mixture of engineers and terminologists representing Teleglobe Canada, the Departments of National Defence and Communications, Transport Canada and Supply and Services Canada.

The Committee, coordinated by the Translation Bureau of Secretary of State, is tasked to produce a bilingual lexicon for translators in the electronics and telecommunications field, with the emphasis on standardizing French terms. Once the work is completed (hopefully by the Spring of 1983) it is expected to facilitate communication among personnel employed in the milieu it addresses. The lexicon will then be available through any terminal accessing the Secretary of State's terminology bank.

2.2.2.2 Telecommunications Cost Analysis (TECA) (RC-T)

Following a full-scale review of telecommunications costs, levels of service, equipment and administration in 1979, Revenue Canada Taxation initiated a project entitled Telecommunications Cost Analysis (TECA). Terms of Reference called for the project to be completed in three stages: 1) feasibility study, 2) pilots and evaluation, 3) long range plan proposal. The following is an update of these undertakings.

(1) Feasibility Study

A Feasibility Study was initiated in early 1981 resulting in a recommendation to proceed with Stage 2 (Pilots and Evaluation) with initial emphasis on the following:

- conversion from ZENITH to INWATS service for Public Enquiries
- reconfiguration of basic telephone systems in pre-selected test sites
- interconnection of basic telephone systems in pre-selected test sites
- introduction of Automatic Call Distribution & Sequencing systems in pre-selected test sites
- development of a Telecommunications Management Manual.

(2) Pilots and Evaluation

ZENITH to INWATS Conversion

The pilot for conversion of the Toll-Free Enquiry Service from ZENITH to INWATS was carried out in four District Offices, namely Quebec, Saint John, Ottawa and Winnipeg. Evaluation of results indicated that a full scale conversion would be cost effective and substantial savings could be realized without degradation of service. Accordingly, over the latter part of 1981 most of the District Offices converted with some assistance from GTA. Several offices did not elect to convert to direct in dial service for local reasons but as soon as circumstances permit they, also, will be converted.

Reconfiguration

A pilot to determine the practicality of reconfiguring existing telephone equipment to reduce cost and improve service was initiated in four representative test sites in mid 1981. Tests were conducted in two buildings in Head Office and three District Offices of varying size, i.e., St. Catharines (small), Hamilton (medium) and Vancouver (large). Results of these tests were evaluated in late 1981 indicating a 16% decrease in equipment rental costs and a substantial upgrade in service levels supporting Taxation functions. A recommendation was thereupon made to proceed with the reconfiguration of all District Offices, Taxation Centres and Head Office and potential annual savings of $500,000 were projected.

Senior Management approved and instructions were developed for Operations staff to perform their own reconfigurations as soon as practicable, with assistance from Head Office and Regional GTA representatives. Reconfigurations are underway in a number of locations at the present time.

Terminal Attachment

In mid 1981, owing primarily to the lack of experienced human resources and a need to change one of the test locations, it was decided to introduce terminal attachment pilots in representative test sites on a progressive basis. In this way experience would be gained from the initial installation for use in subsequent pilots.

Accordingly, the St. Catharines District Office system was installed in December 1981 to be followed by the Ottawa and Kitchener District Office installations which were cutover in December, 1982 and February, 1983 respectively. After being in operation for 10 months, the St. Catharines system was evaluated as being representative of a small District Taxation Office.

An analysis of the evaluation of the St. Catharines pilot revealed that the system installed in that office (ITT System 3100) had received wide acceptance, was operating efficiently and was cost effective. Annual savings in the amount of $24,000.00 are being realized as a result of equipment rental savings and additional economies will be forthcoming because most installations and relocations of equipment are now being performed by RCT rather than Bell Canada. The level of service has also improved considerably. As a direct result of the St. Catharines pilot evaluation, a recommendation has been made to introduce interconnected telephone systems in most of Taxation's small District Offices now being served by carriers subject to CRTC regulation.

The Ottawa and Kitchener District Office installations are scheduled for evaluation in 1983.

Automatic Call Distribution and Sequencing (Public Enquiries)

Based on the St. Catharines District Office pilot, it was concluded that the additional cost of stand-alone Automatic Call Distributors and Sequencers was not yet warranted or cost effective for offices of that size. Therefore the recommendation was made not to install such equipment in offices being serviced by eight public enquiry lines or fewer except to ensure that the functional and technical specifications clearly specified to the vendor that the system had to be capable of handling a heavy annual enquiry workload which peaks during the filing season. The St. Catharines system handles this workload quite efficiently.

Assessments of Automatic Call Distributors (ACD) and Automatic Call Sequencers (ACS) were made based on a modern ACD (SLI) in operation in the Vancouver District Office and a Sequencer (ACS60) being used in the Kitchener Office. As a result of the assessments, a recommendation has been made to introduce Automatic Call Sequencers in the medium-sized offices and Automatic Call Distributors in the two largest District Offices (Toronto and Montreal).

A considerable amount of research has also been done with respect to the introduction of Automatic Answering Devices for servicing Refund Enquiries. A limited number of these machines were being used in several District Offices. In-depth analyses revealed that they were cost effective and should be introduced in all District Offices. This recommendation has been made and agreed upon by authorities who have functional jurisdiction for the Public Enquiries function and at the time of reporting the department was in the process of introducing answering machines across the country.

2.3 Analysis of ITSPs

2.3.1 General Remarks

Sixty-three departments and agencies were requested to complete the Telecommunications Section of Information Technology and Systems Plan (ITSP) distributed by Treasury Board May 31, 1982.

These figures show a decline in the number of substantive reports from last year (27) and a 65% rise in those containing nominal information with the tables.

For the most part, the large users provide significant plans. On the other hand, several smaller organizations appear to be managing their telecommunications more efficiently, giving serious concern to the difficulties presented by the changing technologies and the need to plan accordingly.

Cost savings achievements in departments and agencies were identified in terms of

- upgrading equipment and services
- installing dedicated GDNS terminals
- implementing IN-WATS services and converting to OUT-WATS service from DDD.
- tightening call code controls
- relocating and consolidating staff at headquarters (an identified saving by the Auditor General of $1400 per month plus reduction in equipment)
- program freezing
- improving telecommunications administration and management
- purchasing equipment previously leased (CIDA, for example, predicts a saving of $55,000 annually by purchasing intercom equipment in 1983)
- teleconferencing (by reducing the number of face-to-face meetings)

Certain noteworthy activities have been described in some detail in para. 2.2.2 of this section. In addition to those, mention should be made of a joint Supply and Services/Canada Post Corporation initiative to improve the TELEPOST service, resulting in a savings achievement through reduced use of full rate and night letter telegrams.

Expenditure and person/year increases were attributed to greater usage, higher carrier tariffs and hence GTA rates, increased data facilities and services, decentralization, program expansion, reorganizations, relocations, major building installations and repairs.

Restraint measures were noted to have had an effect on the forecast plans for 1981/82. Target dates for installation and replacement of facilities were deferred in some instances and leased equipment had to be returned in another. Meanwhile, cost effectiveness evaluations rose in priority.

2.3.2 Plans

Departments' plans indicated support for both shared local services and facilities and terminal attachment.

Switches headed the list of significant acquisitions reported, 10 organizations indicating past or current year purchases or rentals and five planning to acquire them within the next five years. The rationale given was to reduce costs, improve and streamline telephone systems. In several cases assessments are planned in terms of cost benefit comparisons with Enhanced Exchange Wide Dial (EEWD) centrex.

Although voice remains the most used service, a steady increase in data requirements is indicated. Telex terminals are being updated at a steady rate to reduce person/year requirements, facilitate speed and accuracy and streamline operations. Word processors and digital facsimile equipment also are high on the list of acquisitions for similar reasons.

Five departments and agencies (Correctional Services, Canadian Industrial Development Agency, Human Rights Commission, Employment and Immigration and Atomic Energy Control Board) reported past or planned acquisition of voice teleconferencing equipment. Favourable comments were recorded by those already engaged in this activity.

Considerable activity is apparent in the area of internal development. Where management reviews have taken place, improved planning and organizational structures have resulted. Although in most departments and agencies the responsibility for office automation is housed within the EDP framework, seven organizations are addressing the issue of integrated technologies by creating special cells or considering organizational realignments; four others already have such structures in place.

Varying complexities of office automation activity were reported by 16 departments and agencies. For the most part, it encompassed word processing, electronic messaging, teleconferencing and records management automation. Telidon is usefully employed by service-to-the-public oriented departments. Interest in voice/data terminals and multi-functional workstations has gained momentum through the Office Communications Systems program field trials, but little activity had begun in this respect at the time of reporting.

Pilot tests and feasibility studies underway or planned have been reported as follows:

- Telex and facsimile systems (CCS) (LC)
- electronic mail (PSC, AECB, RCMP)
- PABX (RC-T, CEIC, IAND)
- satellite communications (CEIC)
  voice transmission
  teleconferencing
  word processing
  facsimile
  data transmission
- TDMA satellite communications (HWC)
- fibre optics intelligence conveyance (RCMP)
- satellite applicability and utilization (RCMP)
- automatic answering devices (RC-T)
- CNCP Infotex (NPB)
- communicating word processors (EA, CEC, EMR, LC, IAND)
- distributed processing network (TC)
- Displayphone (CIDA)
- conversion of toll-free services from Zenith to IN-WATS (RC-T)
- toll-free service in Ontario (CEIC)
- multifunctional workstations (MSST)
- automatic call distribution and sequencing (RC-T)
- integrated office automation system (DND, RC-C&E)
- automated records retrieval system (IAND)

Twenty-three departments reported some activity with respect to a review of telecommunications services and/or equipment, ranging from monthly audits to two full scale reviews in '82 and another within the next two years. Overall reviews at staged intervals have been incorporated into a few planning schedules where management procedures have been tightened.

2.3.3 Annual Reporting Requirements

Despite the retarded pace at which the ITSPs were returned, only one department disagreed with the reporting date. Favourable comments on the requirements to report indicated the exercise is worthwhile as a "checklist for interval planning and collaboration with various branches of the department", a controlling mechanism on uses and costs and as a "very useful means of obtaining Treasury Board approval in principle of the department's intent".

Other comments suggested the need for clarification of requirements in the areas of personnel and costs, that discrepancy between the coding structure of the report and that of APM Chapter 435 App. B presents difficulties, and that Table 4 (Summary of Telecom Demands) is complicated.

2.3.4 Assessment of Services

In assessing the quality and adequacy of service received from suppliers, departments scored GTA and other suppliers on a par ranging from "satisfactory" to "good". Although cost savings achievements were recognized, GTA's billing procedures were widely criticized and inter-city transmission quality was a repeated source of complaint. As well, GDNS order processing was very slow. It was noted that mobile telephone services in the National Capital Region require improvement. GTA's consulting service was rated helpful and beneficial.

Carriers were judged to be taking more interest in the end user than before the interconnect ruling and provided accurate and consistent billing. While some services had improved, however, others needed upgrading. One report stated that - especially in the National Capital Region - "the lack of state of the art service from the common carrier inhibits departmental potential, particularly in the area of service to the public". Bell's policy respecting minor relocations, causing costly time to the Telecommunications Coordinator, was another source for complaint.

2.3.5 Usefulness of the Annual Review as a Tool for Planning

Comments on the Annual Review varied, however the general opinion was that it is informative and fulfills a useful purpose.

2.3.6 Adequacy of Telecommunications Policy

APM Chapters 435 and 436 have been very helpful to departments in the planning and management of their telecommunications resources, though one report found them inadequate in terms of technology and personnel. A further encouraging note is that distribution of the Telecommunications Management Manual by DOC has acted as a catalyst for internal policy and guideline development.

Deficiencies in existing policies and guidelines were identified in the following subject areas:

- electronic transmission of information which must be protected but does not fall into the category of national security
- terminal attachment
- clarification of the common services policy
- clarification of definitions for "telecommunications" and "telecommunications personnel"
- PBXs within consolidations
- Enhanced Exchange Wide Dial centrex

As well, concern was expressed about the urgent need for new policies to shape the automated office.

2.3.7 Training

Most departments and agencies reported minimum telecommunications training activity, but stated their requirements to be significant and urgent. GTA's seminars and TSO training courses are widely supported. Common carrier seminars, supplier shows, a few private sector courses, some in-house information sessions and training manuals for the most part complete the training framework. In two cases internal courses have been or are being developed (CEIC and RC-T).

In identifying their future needs, organizations have recognized a requirement for both basic and advanced formal training which should include data communications. A need for end user training was also identified and this should take place on the job where operators cannot be replaced for any length of time.

Finally, a universal cry was issued for a programmed approach to disseminating up-to-date information on state-of-the-art technology to keep departments and agencies abreast of developments for planning and budgetary purposes. This was seen as a central agency responsibility.

2.4 Telecommunications Advisory Committee

Since its formation in 1977 the Telecommunications Advisory Committee (TAC) has assumed an increasingly valuable position in the federal telecommunications community. An advisory body to DOC and a supportive arm to departments and agencies, the Committee is a focal point for addressing the concerns of the community as telecommunications seeks a new niche in the more complex hierarchy of communications.

Two major achievements of the year had significant economic implications. After many months of negotiations with TCTS an agreement was achieved whereby the Government would procure its Telpak services as a single customer, with the Government Telecommunications Agency acting as its agent. Based on the circuitry procured for DSS, DND, DOE(AES) and Transport Canada, this measure is estimated to be saving the federal budget approximately two million dollars annually. It has been in effect since the first of April, 1982.

The other thrust directly addressing costs was the definition of expenditure coding to permit all costs to be accounted for and made easily visible for departmental and central authority accounting and budget control purposes. As a follow-up to this work, TAC is proceeding to identify information and statistics that will facilitate telecommunications management and to recommend appropriate action on regulations, policies, directives, guidelines and administrative practices.

Other initiatives of the Committee included support to DOC/GTA in providing departments with interim guidance on PBX acquisition and the pursuit of secure transmission of data through RCMP and DND systems. A protected electronic channel connects certain departments to the External Affairs switching system which also handles classifed messages.

G. Carriers and Industry

The information contained in this section is intended to inform departments of the developments taking place with the telecommunications carriers - their newest service provisions and plans for future service - and to indicate the progress of Canadian industrial suppliers. This should bring departmental planners abreast of the industry in looking at their own present and future requirements. For the federal Government's posture vis-à-vis these developments, please refer to Section F 2.

1. Carriers' Progress

1.1 Teletex

An international standardized telecommunications service which allows office text machines from different manufacturers to communicate with each other: that has been the dream of office telecommunications planners and users since the antiquated teleprinter machine started to make room for memory typewriters and word processors. 1982 became the year the dream materialized and once again, as with the advent of each new communications vehicle, Canadians could look forward to closer ties with distant countries of the world.

Following the CCITT ratification of standards for Teletex at the Committee's November 1980 Plenary Assembly, the TCTS Computer Communications Group scored a significant coup by becoming, in 1982, the first supplier of Teletex service in North America. The lack of international agreement to common standards had previously restricted users of this type of equipment to communicating only with fellow users of equipment provided by the same manufacturer.

The unique features of Teletex terminals are that they are fully buffered, operate at 2400 bps, and provide for call set up, message transfer and call disconnect on an automatic basis, without operator intervention. In addition, inputting, editing and printing functions are unaffected by outgoing or incoming calls. One multifunctional terminal used for the preparation and editing of text as well as text communications can replace two conventional devices: a typewriter and a low speed message teletypewriter.

CCG's Teletex service, which uses the public switched telephone network, incorporates an electronic directory and provides transmission of text at 2400 bps to any terminal in Canada or abroad which adheres to the international Teletex specification. Overseas Teletex and Telex terminals are accessed via the Teleglobe gateway.

Different data speeds, such as 50 bps traditionally used for Telex transmission, are not a barrier. The Teletex-to-Telex physical message transfer is handled by the network, with protocol changes made within the terminal. Teletex and TWX will be able to communicate, as well, through a conversion facility being developed by CCG.

As the new service is approximately 40 times faster than Telex and 20 times faster than TWX, Teletex represents the modern alternative to these traditional message services.

Costs include terminal (varying according to user's requirements), access lines (varying across Canada but averaging $35.00 a month) and usage charges (long distance at tariff and free local calling, as normally experienced for voice communications.)

CCG predicts future enhancements will include a mixed-mode terminal which will allow Teletex and facsimile capability in a common terminal. Teletex is also expected to be able to interwork with the new Group 4 facsimile terminals (which will use the Teletex protocol) and with Videotex databases. While intra-messaging will be its first useful function, it will become a full electronic mail service in its maturity. By early 1984 it is expected to interwork with Envoy 100 to provide multi-point addressing.

On the international scene West Germany, Sweden and Britain had begun Teletex operations and it was predicted that more than 30,000 terminals would be operating in 10 European countries by the end of 1983. CCG expects TWX service to have migrated to Teletex by 1990 and that Canada, alone, will have 140,000 Teletex devices by the end of the decade.

Although the United States was off to a slow start, widespread use of the service is expected within the next two-to-three years as competition among the record carriers increases. RCA Global Communications was the first International Record Carrier (IRC) to go after the $30M a year transborder Telex market when the IRCs became qualified in 1982 to operate within U.S. boundaries. Western Union Telegraph Co., which has had no direct competition in the provision of Canada/U.S. Telex traffic with CNCP Telecommunications, was also negotiating for the service.

1.2 Infotex

CNCP Telecommunications Infotex service is designed to operate not only as an information retrieval system but also as an electronic mail system. It is expected to expand in stages over the year 1982-83. Initially subscribers will have access to other communicating word processors in Canada, the Canadian Telex network and such electronic mail services as Telepost in Canada and Mailgram in the U.S. Subscribers will be able to communicate with U.S. Telex and Telex 2 subscribers, as well as Telex subscribers in other countries. Though the service was developed to operate at speeds of 1200 bps, 2400 bps protocols will be added which will make Infotex compatible with the Teletex service.

1.3 Field trials which will extend over 12 months began in Ottawa, Toronto and Montreal on an exciting new network developed by Bell Northern Research and the Trans-Canada Telephone System.

iNET, an acronym for "intelligent network", is designed to link business computers, bridging the language differences and providing Canadians with universal access to the computerized data banks using a variety of terminal equipment.

Occasional users, managers, executives and others whose lack of expertise previously denied them access to data processing systems will be able to retrieve information not just from one computer but from a variety of hosts. This is accomplished by embedding value added features in the network, placing the operation and administration of certain functions within the network itself. The network access node, for instance, performs all of the log-on sequence and hand-shaking procedures that would otherwise be performed by the user. Once the user has initially logged on to the system, therefore, access to successive hosts is virtually automatic.

As well, terminals of one speed and type may interface with databases of another. CCG will be provided information for billing and traffic analysis, permitting the Group to perform third party billing on behalf of information and service providers.

The field trials, using Telidon terminals, are designed to assess the market requirements for iNET, Business Videotex and value added services; to evaluate potential market applications within specific communities of interest (travel, finance, retail) to gain expertise in implementation of these services for commercial service introduction; and to support ongoing development work in office automation. Participants are representative of eight major categories of potential users, namely: banking, bibliographic, energy, real estate, communications, law, travel, and Canadian government.

1.4 Other innovative services from Bell include:

- Vista - Canada's largest field trial of Telidon technology. The user can call up a wide variety of information on the switched telephone network for display on home television screens.

The trial, sponsored jointly by Bell and DOC, is managed by Infomart on a contract basis. Preliminary operations started in Toronto in May, 1981.

- Datalink - the final portion of the integrated program of digital network services for Canadian computer users.

- Envoy 100 - a national computer-based messaging system which grew to over 3000 users by mid-1982, about 100 of whom bore federal identification. It operates over Bell's Datapac, TWX or switched telephone network. French language commands are also planned, which will increase its usefulness in the public sector. The service is distance insensitive. Costs are assessed according to the number of characters generated plus overhead. A fixed rate of $20/mo. is charged in addition to a $3.00/mo. user rate.

- Envoy 200 - still in the development stage. It will bridge a family of messaging services: Teletex, TWX, Displayphone and Datapac 3101, all of which will be serviced by an electronic directory. As a value added service it will have store and forward capability. The potential need to resolve the question of responsibility for storage of messages is looming: should it lie with the terminal manufacturers or the carriers?

- ISBN - an integrated satellite business network initiated in 1981. Plans are to introduce service in 1983 following the launch of the Anik C-1 satellite. It will provide flexible high-speed network services to distant locations. The rating concept, to be based on the ISBN serving area, will be distance insensitive. Rating elements will include a digital transmission station, interface and local distribution charges.

1.5 Bell's computer communications network, Dataroute, is to be monitored by a new network management system (NMS). A million dollar contract was awarded HiTech by Bell to develop software which will allow CCG to respond to customer trouble reports more swiftly and effectively, incorporating well-sized display boards and colour graphic terminals to display geographical areas across Canada where network problems may occur. Implementation will be phased in over a one-year-plus period.

1.6 Expansion of the TCTS digital network to Vancouver, connecting new digital switches there with similar equipment in Winnipeg and Toronto, has been a 3-year, $90M project. Existing digital switches in Montreal and Toronto have also been expanded and new digital switches in Ottawa and Montreal are connected to the network over Bell's digital cable facility. The network has been in partial operation since February, 1981. Cleaner transmission and lower background noise on cross-Canada telecom traffic represent the major improvements it offers. Products used include AEL Microtel's GTB-3 EAY switch, Northern Telecom's DRS G8 radio and DMS-200 switch. For information on GTA's plans to provide the government shared services with the new network offerings, see section F 2.

1.7 Capitalizing on the 1979 CRTC system interconnection decision which gave CNCP the right to allow its customers to gain access to CNCP services through the Bell Canada locally switched telephone network, CNCP prepared to make available to major customers private line voice circuits on a fixed term, fixed price basis.

1.8 A further manifestation of interconnect will be a new CNCP service called Econovoice. By means of a voice concentrator the service will permit a single private line to carry two or more simultaneous telephone conversations or their equivalent with no deterioration in quality or loss of privacy. Designed for businesses, industries and government departments which have private network needs for telephone or other telecommunications traffic, it will cut long distance costs by as much as 32 percent on three-year contracts.

1.9 In the area of U.S.-Canadian traffic, CNCP proposed to hook up its broadband exchange service with the Metro-1 service offered by Western Union Telegraph Co., of Upper Saddle River, N.J. This will give subscribers the advantage of making long distance calls into the United States at rates that may be only a third the cost of direct distance dialling calls provided by the telephone companies.

1.10 In July, 1982 Bell Canada announced plans to reorganize its corporate structure to separate the company's regulated telecommunications activities from its non-regulated business. Bell Canada will continue as the regulated utility, owning that part of Tele-Direct's operations dealing with the printing and publishing of telephone directories, as well as 24.6% interest in Telesat Canada and 30% interest in Bell Northern Research. The new non-regulated company, to be known as Bell Canada Enterprises Inc., will parent existing subsidiaries including the 55%-held Northern Telecom Ltd., Bell Communications Systems, Bell Canada International, Tele-Direct's non-regulated operations, and provincially-regulated telephone operations.

1.11 Within 18 months of the CRTC interim decision on inter-connect 150 telephone equipment companies were in business.

1.12 In response to an identified need to provide a regular forum to review, discuss and introduce matters of mutual interest, a GTA/TCTS Data Operations Coordinating Committee was formed with the following terms of reference:

- review of current, near-term and future data operations, projects and services;
- clarification and confirmation of both parties' objectives, priorities and projects; and
- identification and correction of areas of concern to GTA and TCTS which relate to the daily provision of service.

The TCTS Computer Communications Group initiated a series of seminars for the purpose of acquainting appropriate GTA personnel with their planning and developmental activities. Digital services (covering Dataroute, Datapac and Datalink) was the subject of the first seminar, held in March. It was followed in June by a briefing on value added services.

2. Industrial Update

Although Canada's high-tech industry generally fared better than other Canadian manufacturers in this severely recessed period, Canada is "barely holding its own in the international race to exploit the new technologies". So stated the Science Council in its 1982 report, Planning Today for the Information Society. The Council warned, "While Canadian firms have been competitive in 'stand-alone' products, the trend towards integrated systems imported as entire operating systems is likely to put Canadian firms at a severe disadvantage". The hardware sector in Canada remains largely a branch-plant operation, less than 10 per cent Canadian-owned in contrast to the computer services industry, about 80% Canadian-owned. The Council recommended that Canada choose which products will be developed in Canada, which imported from abroad and which can or should be licenced for manufacture in Canada. The need for a broadly-based chip-manufacturing industry was emphasized. About 20 chip-dependent companies have been left without a domestic resource since 1975.

2.1 Office Equipment Products

Government-sponsored field trials are being carried out in federal departments to provide industry and government with experience in designing, planning, operating and assessing integrated electronic office systems. Several Canadian companies have formed consortia to develop integrated systems for the trials, including Bell Northern Research, Office Communications Research Associates and Systemhouse, among others. (For details of the field trials, see section H 5.1.)

2.1.1 Both Mitel Corp. and Northern Telecom Ltd. are commanding the attention of foreign and domestic markets with their developments in integrated voice and data digital switching systems. Mitel's SX-2000MG and Northern Telecom's SL-100, which will handle up to 10,000 and 30,000 lines respectively, are designed to serve large-capacity requirements such as those of government and industry. The equipment can switch telephone and computer data as well as act as the core of an electronic office communications system.

2.1.2 Along with SL-100, Northern Telecom provides two other members of the SL Family. The SL-1 business communications system serves from 80 to 5,000 lines and the SL-10 data packet switching system is designed for private data communications networks to permit exchange between a variety of computers and terminals. The smaller SL-1M, a new digital PBX that will handle 60 - 400 lines and boasts the capability of moving the telephone from one plug to another while in use without losing the connection, was also introduced. Call detail recording capability allows call detail records to be collected on an optional type unit located inside the SL-1M cabinet, and used for record-keeping or processed into cost control reports.

2.1.3 The SX-2000 is the first of a family of large integrated switching systems that can transmit data at a rate of 256 kbps. As an office automation supplier, it offers a terminal that can be an executive or professional workstation, a word processor, a powerful graphics terminal, a console or a remote diagnostic tool and switch programmer. Hardware includes a full computer keyboard, a telephone keypad, a 16-bit microprocessor and a bit-mapped video screen. The SX-2000 is to be connected to its peripheral devices by a Xerox Ethernet-based data link. By December 1983 this interface is planned to be expanded to include access to foreign peripheral devices such as computers and advanced work stations. Ethernet will also provide the medium to expand computing capacity and mass storage in the SX-2000 for the automated office.

2.1.4 Bell Northern's Displayphone is being marketed by the CCG as Bell's initiation to the automated office. Combining enhanced voice and data services which can be used either separately or simultaneously, it is designed as a managerial workstation. The data package uses Envoy 100 services, permitting access to both local and most public data bases. The product was marketing in 1982 (on a purchase basis only) for just under $2500 plus a $20-a-month maintenance charge.

2.1.5 In the fall of '82 Mitel Corp. brought out its first multi-functional executive workstation, Kontact, combining electronic mail, time management, financial planning, data communications and word processing with voice communications. It is capable of operating with any existing analog telephone system and will provide specific interface capabilities for both analog and digital PBXs.

2.2 Integrated Information Management Systems

Near the close of 1982 Northern Telecom publicized a five-year research and development program to devise an integrated information management system called "OPEN World" (Open Protocol Enhanced Networks). The plan calls for a variety of systems, equipment, networks and services to operate under the control of an SL PBX controller to form one integrated, evolving system.

While products, services and features to implement the system will be available from the company, some of its interface specifications are being made available to other manufacturers and co-operative agreements are being negotiated with a number of major data processing manufacturers to ensure maximum compatibility of equipment.

H. Environmental Factors

1. Regulatory Trends and Standards

1.1 Regulatory Trends

1.1.1 In Canada the business sector and government are served by two national carrier groups who provide a wide variety of specialized voice and data services on a competitive basis. A distinctive feature of the industry structure in Canada is that regulatory jurisdiction over the carriers is exercised at the federal, provincial and in some cases the municipal level. Therefore when examining regulatory trends it is necessary to take into account the sometimes differing regulatory climates.

1.1.2 At the federal level the CRTC has, in a number of cases, moved in the direction of greater competition where it has determined that such a move was in the public interest. In a series of decisions which affirmed the right of subscribers to attach their own equipment to the telephone network, the commission has permitted a greater degree of competition in the terminal equipment industry. At the provincial level varying degrees of increased liberalization of terminal attachment rules are planned in P.E.I., Nova Scotia, Quebec, Manitoba and Alberta.

1.1.2.1 CRTC Decision 82-14 provided for the continuation of the liberalized policy of permitting the attachment of subscriber-provided terminal equipment within the telephone companies regulated by this body: Bell Canada, British Columbia Telephone, Terra Nova Tel and NorthwesTel.

In addition the decision provided direction on such important issues as:

Inside Wiring

- Multi-line subscribers leasing their terminal equipment from the carrier will continue to have the inside wiring provided by the carrier. Those who choose to purchase will be required to provide their own associated inside wiring. The decision also covered such points as demarcation point and selling in-place multi-line wiring that can be reused.

Interpositioning

- Interpositioning equipment will be permitted following development of the necessary standards.

Telex and TWX Terminals

- Telex and TWX subscribers may attach their own terminal equipment to a carrier's network provided the appropriate technical standards are met.

Network Non-Addressing Devices

- Any network non-addressing devices certified by DOC, and bearing a label to that effect, may be attached to a carrier's network.

Also included in the decision were guidelines on issues such as technical standards and participation by carriers in the terminal equipment market.

Telecommunications Coordinators throughout the Government may obtain additional information of the revised policies of four companies involved and their resulting implications as well as the current policies of the other major Canadian telephone companies in GTA Circular Letter 83/375.

It should be noted that the TAC Working Group on Telecommunications Planning has formed a subcommittee to deal with the issue of building wiring. Recommendations from this group will result in the development of firm guidelines dealing with this issue.

1.1.3 Another CRTC decision permitted CNCP to interconnect with the B.C. Telephone local telephone network as well as that of Bell Canada. This will allow greater competition in specialized and private line services.

1.2 Standards

1.2.1 In both CCITT (International Telegraph and Telephone Consultative Committee) and the International Organization for Standardization (ISO), there continues to be a high level of activity to develop a Reference Model for Open Systems Interconnection (OSI) which will permit the linking of computer communications systems and services of different manufacture and protocols. The establishment and implementation in Canada of such standards are fundamental to the full realization, through interconnection via Canadian public telecommunications networks, of new national information services such as the National Library Bibliographic Network, Telidon/Videotex Systems, Office Communications Systems, Electronic Payments, Messaging and Trade Information Systems.

1.2.2 In another area, the Telecommunications Advisory Committee (TAC) monitored the development of a bilingual glossary of telecommunications terms.

1.2.3 The UHF Spectrum Allocation Policy announced in March 1979 made available spectrum in the 400 MHz and 800 MHz bands to be used by medium and high capacity public mobile radiotelephone systems and other mobile radio systems. These systems, referred to as cellular systems, will provide the opportunity for a superior quality of service compared to existing radiotelephone systems and will in future allow for the operation of portable radiotelephone units at reasonable cost for government and business users in Canada and the U.S.A.

As widespread application increases, national compatibility will be a requirement of cellular systems. In order to achieve national and, hopefully, Canada/U.S. compatibility, a number of technical, administrative and other factors are involved. On the question of technical standards, the U.S. Federal Communications Commission adopted, with certain modifications, the standards recommended by the Electronic Industries Association (EIA). The Department of Communications and an ad hoc group of the CRTPB (Canadian Radio Technical Planning Board) Land, Fixed and Mobile Committee are currently reviewing the EIA standard. Based on the results of this review, these standards may be adopted by DOC with modifications as necessary for use in Canada.

2. Economic Influences

The recession that plagued the Canadian economy throughout 1981-82 had its impact on the electronics industry as well as other areas.

Perhaps the largest industrial employer of technical and scientific workers in Canada, the industry suffered a trade deficit of $3.3 billion in 1981, about half of which was accounted for by the computer and office products sector. By 1985 this deficit is expected to reach $5 billion with an accompanying loss of 60,000 jobs in the interim.

Statistics for telecommunications, however, are somewhat brighter. In 1981 telephone apparatus and parts experienced a trade surplus of $208 million in addition to $191 million in commercial communications equipment.

In the longer term, by 1990 the Canadian market for integrated office automation systems is foreseen to be between $15 and $20 billion and the international market 20-25 times greater. Obviously this sector represents the potential for significant gains in revenue and jobs to Canadian industry and labour.

The Canadian telecommunications industry is continuing to experience rapid technological change driven by advances in the fields of electronic switching, digital transmission, satellite technology, fibre optics and cellular communications. These advances have a very significant effect on the characteristics and capacity of telecommunications systems and continue to lead to decreasing real costs of telecommunications services. Moreover, the improvements in telecommunications technology are only part of the broader range of advances in many areas of electronics. Of particular significance are the advances in computing, both in information storage and in data processing, that have led to dramatic improvements in the performance, reliability, software and productivity of computer operations over the past 20 years. For example, in the mid 1960's, an IBM 360 model 30 computer could perform 33,000 additions per second and cost in the neighbourhood of $280,000. Today, IBM manufactures a personal computer that can perform 700,000 additions per second and costs approximately $5,000.

One of the results of these technological developments is the increasing convergence of telecommunications and computing into a hybrid sometimes known as telematics. There is no doubt that the on-going advances in telematics and in other areas of micro-electronics, together with the increasing level of diffusion of these innovations in the economy will affect the way we learn and work - education and employment.

Advances in telematics and related microelectronic technology may be expected to have the most significant impact on certain economic sectors:

(1) where production is coming to be dominated by information processing, as in

- printing and publishing
- communications and education
- office computing, accounting and word processing
- banking and insurance, and
- wholesale and retail distribution

(2) where production processes still make use of functions suitable for further automation, i.e.

- parts of the chemical industry
- manufacture of plastic products, pottery, china, earthenware, glass and glass products
- manufacture of wood and wood products, paper and textiles

(3) where products are still assembled from many single parts or where continuous oversight of production processes is needed as in

- the manufacture of motor vehicles, mechanical and electrical engineering, and
- the manufacture of precision instruments

1981/82 heralded an awakening to the realization that low productivity is hampering our ability to be competitive in world markets. The punch came when it was disclosed that Canada has the lowest productivity rate of any of the eight largest members of the Organization for Economic Cooperation and Development.

In the federal Government white collar productivity is the area of primary focus and efforts are being made by various field trial evaluators to measure productivity shifts as new systems are introduced.

Stanford Research Institute figures indicate that office productivity in the United States rose only four per cent in the decade 1967-77. The payoff to office automation is expected to be achieved through gains in productivity in the managerial and professional realms where 66 per cent of the labour costs are concentrated.

Teleconferencing, electronic mail and home workstations are all potentially productivity-efficient and at the same time can replace the conventional alternatives that are so highly energy-consumptive. Through these and other technological innovations the Government can combat inflation within its own bureaucratic boundaries.

While broad economic advantages are obvious, less certain is the impact of the speed of change and the net impact on employment.

Apprehension about the effects of technical change on labour dates back at least as far as the first century when the Roman Emperor Vespasian opposed the use of water power for fear it would create unemployment. During the industrial revolution textile workers with the same concern destroyed new labour-saving machinery powered by steam engines. History is filled with examples of changes in instruments, processes and products which have caused dislocations in employment and skills.

In the short term the information industries have created jobs. Looking ahead into the mid-'80s, however, the contribution of these industries to strong economic growth could be diminished by a shortage of skilled labour.

Special training programs in high technology skills and their enlargement, together with re-training programs for those who may be displaced, are urgently needed in the federal Government to prepare human resources for the automated office.

3. Social Factors

A consumer study by an American consulting firm, Yankelovich, Skelley and White, provides an interesting profile of people in the '80s. With less money for entertainment and travel, we are spending more time around home. The study indicates a growing passivity - attributed to an aging population - and a gradual acceptance of alternative lifestyles. Hostility toward government and business, erosion of the traditional middleman's role and an increasing reliance on communications are emerging, as is the all-important breakthrough for the communications industries: a conversion from the fear of the '60s and '70s to faith in technology.

Preceded by the sudden popularity of home computers, this change of attitude has begun to permeate the working environment. Home lifestyles are adjusting to the transition and so must the traditional office concepts undergo adaptation.

The automated office presents numerous challenges of the social and human factor variety: its effects on special groups of employees, such as women and managers; special classifications, such as clerks, stenos, typists; training implications in terms of needs, budgets, levels; career paths; health ... and so on.

In the federal Government we must concern ourselves with all of these factors and more. At the corporate level, Office Communications Systems (OCS) field trial evaluation teams and various interdepartmental committees have been assigned to address them. Their findings and recommendations will lay the groundwork for future Government policy.

Meanwhile, with the micro moved to the desk, managers find themselves confronted with a number of immediate concerns. Operational areas involving text processing and editing, electronic mail, data processing, electronic filing and management information are all affected and these represent a considerable percentage of office duties. As a workstation can provide the capability of performing more than one task, less physical exercise is required in an already sedentary environment. This, in turn, gives rise to potential health and social interface problems.

Prolonged, uninterrupted work at a video display terminal (VDT) has been found to produce symptoms of stress and fatigue. In equipping offices with terminals, managers should give careful thought to minimizing these hazards through ergonomics - the science of adapting equipment and environments to human skills and requirements. Bear in mind the characteristics of the office that workers have identified as most important to their job performance; namely,

- the ability to concentrate without noise and other distractions
- heat, air conditioning, light and ventilation
- access to tools, equipment and other work materials, and
- conversational privacy

Another area of particular current interest to the Government is distance and computer-assisted education. During the 1970s the federal Government funded the development and launching of experimental satellites and made channels available to provincial communications authorities and other organizations to conduct pilot trials, both in remote communities and in major metropolitan areas, to demonstrate the feasibility of using satellites in distance education. One such experiment linked classes of engineering students at Stanford University in California with their counterparts at the Carleton University School of Engineering in Ottawa, allowing students in both classes to see, hear and question between locations thousands of miles apart.

Furthermore, since all indications are that the cost of computing power will continue to fall, businesses, educators and Government agencies in Canada have been working for a number of years to develop the means to apply the powerful combination of advanced communications technology and low-cost computing power in an education setting.

One promising result of efforts in this area has been the development of Telidon, the highly sophisticated alpha-geometric videotex system developed by researchers at the Communications Research Centre (DOC). Telidon is essentially a computer-coding format that allows coloured graphics and text to be transmitted via telephone line, coaxial cable, broadcast signals, microwave, satellite, optical fibre or even laser beam. The Telidon system can be used to provide educational programs, diagrams and tests via small microcomputers in homes and classrooms. It can also be used as part of a videotex network with terminals attached to television sets accessing information from a number of host computers around the country or around the world. Additionally, the system can be used with large screen projectors for classroom or public displays.

The Department of Communications is assisting educational organizations in many parts of Canada to develop Telidon systems and software to be used as a teaching aid, an administrative tool, a self-learning system and even as a guidance counselling service to help students plan their career paths. Work is underway to integrate Telidon with educational computer languages, such as Plato and Logo, which allow even young school children to learn advanced concepts of mathematics and geometry through self-feeding terminals.

4. Available and Emerging Technologies

"Innovation," as defined by Gordon B. Thompson, of Bell Northern Research, "is the application of technology". In addressing an economics seminar at the Department of Communications in June 1982 he gave the following explanation:

> "The application of technology produces impacts on the host society, and it is impacts that characterize the innovation. Just as the physicist has never really seen an electron, and knows it only by its impacts, so we can only know an innovation by its impacts. Innovation, when viewed in terms of the impacts produced on the host society, can be divided into two classes, the *intensive* class, and the *extensive* class.
>
> "The *intensive* class of innovation contains all those very important applications of technology where the major impact is one of intensification of already established processes. The class is characterized by notions of cost saving, efficiency, labour release, and substitution of new methods to do old things. In a word, the western idea of productivity gain describes the major aspect of this class of innovation.
>
> "The *extensive* class of innovation contains all those innovations where the impacts can be described as extending widely across society and deeply throughout time. Here, the essential notions are of labour absorption, creation of new sources of wealth, and the doing of new things. Innovations of this class tend to be non-conservative in the sense that they allow an opening of the otherwise closed economic system, temporarily destroying the conservatism of the 'zero sum game' economy. In a deep and creative sense, this class of innovation produces fundamental increases in mankind's productivity by opening up whole new opportunity areas."

George Ray of the National Institute of Economic and Social Research uses the term "super innovations" and predicts in a *Lloyds Bank Review* article entitled "Innovation in the Long Cycle" that the next super-innovation is due either around 1985 or 1991.

On the assumption that the last "super" was the chip (1959) and given that the waves of its aftermath are still splashing into the economy, it is difficult to foresee another early advancement of such magnitude in this electronic technology. Those waves, however, represent significant innovations of the intensive variety, some of which are described in this section.

4.1 Networks

Network technology has been particularly volatile. Dramatic new capabilities are emerging through advances in satellites, fibre optics, coaxial cable, microwave and cellular radio modes.

"The melding of television, voice and data networks now taking place will provide many creative opportunities for both vendors and user management," wrote Walter A. Levy in the November-December '81 issue of *Business Communications Week*. "This situation places a burden on user management to broaden its understanding of the technology and state of the market and be both prudent and innovative - a difficult challenge."

The following review of network activities on the global, national and federal Government levels is intended to give a helpful perspective to those confronted with that challenge.

4.1.1 *On the global scene* a digital communications system known as the Integrated Services Digital Network (ISDN), linked by satellite and optical fibre cables, is slowly taking form. It could create a worldwide telephone system, data and TV network. The main motivations for the ISDN are the economies and flexibilities its integrated nature promises. Many of the emerging new services are digital. These can be combined with existing services to use an integrated transport capability at a significantly lower overall cost than if each service used a separate transport capability. As well, networks will be able to be planned and constructed before the specific services of the future are defined, tested and made available.

The global concept presently being studied by the International Telegraph & Telephone Consultative Committee (CCITT), is based upon the use of space platforms positioned over the Pacific, Atlantic and Indian Oceans and connected by inter-satellite links.

As for the terrestrial bridges, which will use *optical fibre cable*, Japan is expected to offer ISDN service commercially in 1983. European countries have now started to introduce fibre optics into their communications networks and 1988 has been suggested as a reasonable target date for optical fibre cable use on North American routes.

The advantages of fibre optic technology, as compared with copper wire include a far greater information-carrying capacity, smaller diameter and lighter cables, lower loss (larger repeater distances), immunity to electro-magnetic interference and economy. A telephone system using glass is reported to expend about one-third the electricity required by today's networks and a further economic plus anticipated by the International Record Carriers is that old copper cables may represent scrap value exceeding the cost of the replacement fibre optic cables.

Research funded by the federal Government on fibre optics is described in para. 5.2.

4.1.2 In Canada, Northern Telecom plans to produce an integrated information management system within five years based on digital communications controllers. The concept is known as the OPEN World (Open Protocol Enhanced Networks). Existing copper wiring already installed in most buildings will be given increased transmission capability to become a high-capacity "information pipeline" extending to every desk. (Reference may be made to Section G 2.2.)

4.1.3 Through recent years in Canada many improvements have been brought about in the public switched telephone networks (PSTNs) as a result of the new technologies. The Government telecommunications network has, in turn, profited in terms of quality, efficiency and cost as the technologies have been made available; e.g.

- The latest packet technology is used to provide two highly efficient data communications networks: TCTS Datapac and CNCP Infoswitch.

- The Anik A domestic satellites have provided some government inter-city and facsimile traffic between Toronto and Vancouver, as well as teleconferencing across the country with a large number of R/T stations.

- The introduction of electronic stored program control (SPC) switches in the PSTNs during the past five to seven years has provided opportunities for a wider range of services, traffic measurements and network management/operation control; e.g., integrated centrex/telephone service and a traffic management system. In addition, numerous value added features are available such as multiple address delivery of single messages, address stored list, delivery priorities, central archiving, segment billing, alternative routing....

- The availability of electronic (SPC) technology in both small and large PABXs (such as the SG-1 and SL-1) has provided service improvement, service features and cost reduction for government services as have the families of electronic "digital" PABX systems introduced into PSTNs and government networks (the Northern Telecom SL-1 family and Mitel's SX series).

- Digital telephone switching technology, through PBX or Centrex service, can now support indifferently voice and data networks up to 64 KBPS and will soon have the capability of interfacing with universally accepted standard network protocols, such as X.25.

- The fast pace of network digitization (spanning customer terminal, transmission and switching facilities) is having a big impact on the architecture of private telecommunications networks and services leased from the carriers. This includes the Government inter-city and data networks using DMS, RLM, and digital transmission facsimile. To support leased lines, the new switching systems can interface with Telex, TWX, DDD, international telex and international DDD networks.

- Intelligent communications nodes allow interfacing of equipment from different vendors and concentrate the information on a single transmission path. Intercommunications of different vendor systems, to a certain extent, are also allowed. Future capabilities of these systems will improve to achieve total consolidation of data networks.

- As terminals multiply and increase in application, operating costs can be reduced through shared access and use within a common building site. The Local Area Networking concept emerged as a solution to permit the delivery and exchange of word processing, electronic mail, electronic files, teleconferencing, facsimile and voice mail.

- Progress has been made in establishing universal standards and protocols, such as X.25, X.21 or RS 449. Other standard protocols, such as OSI, are being developed and agreed upon which will permit intercommunication between different types of word processors, terminals, facsimile, and host computers.

Beneficial changes to the Government's private networks will be realized through the new technologies being field-tested in the Government. These tests involve videotex, communicating word processors, electronic mail, electronic files and video teleconferencing.

Provisioning of digital service in the early to mid 80s via the PSTN, Anik C digital channels, CNCP TDMA on Anik C and TCTS coast-to-coast digital radio (8 GH_Z) will greatly enhance Government telecommunications.

Anik C technology will provide an extensive number of telephony gateways and the availability of low cost echo-suppressors will offer significant potential for long-haul Government telpak to be carried in part by satellite.

In the area of mobile service, cellular radio and satellite technologies are opening up new vistas.

4.1.4 Local Area Networks (LANs) are proliferating to accommodate office automation. These are the internal office communications networks required to allow access to and communications with a variety of data and word processing equipment and systems. The system permits multifunctional workstations by allowing the individual to access computing power and data files, perform word processing and transfer documents to and from storage and other users. It may also provide telephone, voice messaging and limited terminal capabilities.

Three basic technologies are emerging for office communications: broadband, baseband and twisted wire pair. Choices depend on user requirements. Both baseband and broadband, using coaxial cable as a transmission medium, support high speed data. Xerox's Ethernet and WangNet, respectively, are examples of these. Because multiplexing can be used with broadband to divide the total bandwidth of the cable into many separate channels, image and voice can be serviced as well.

Twisted wire pairs are used primarily for voice communications. The extended capabilities of PBXs, however, permit them to act as control centres for both voice and data communications (e.g. SL- and SX- families of switches; Displayphone). High speed data transmission can be provided on dedicated lines.

Including PBX manufacturers, there are over 20 vendors marketing LANs of various kinds. In the PBX market, Rolm, Mitel, Northern Telecom and Intecom are offering digital PBXs with integrated voice/data networking.

By linking together local area networks using wideband satellite channels "super networks" will evolve.

4.2 Satellites

The rise in demand for information services exemplifies the need for wideband facilities that can cope with the explosive traffic growth. According to a report from International Resource Development (IRD) Inc. by 1985 the market for wideband systems and services will increase more than 100% over the 1981 total and will further redouble by 1991. Geostationary communications satellites provide wideband channels and have point-to-multi-point or broadcast capability, thus facilitating teleconferencing, video conferencing, electronic mail and other business applications. Since voice traffic can be digitized, it can be transmitted with the data, facsimile and video traffic as one integrated, digital bit stream. Subscribers can therefore adjust the mix of traffic which allows them to favor voice during the day, for instance, and data and facsimile at night. This flexibility leads to changes in management strategies favoring strong central control of the information services function.

Among the roles satellites have to play in the future is a switching of signals for flexible interconnection. This function, which employs time-division techniques combined with multiple access to switched or scanning beams, will not be applied until the late '80s.

Government plans for use of satellite technology are covered in Section F 2.1.2. For information on other field trials, see also F 2.2.1.1.

4.2.1 "The biggest, heaviest and most powerful communications satellite Canada has launched" found its place in space (104°W longitude at an altitude of 36,000 km above the equator) on August 26, 1982. It was the first of two Anik D satellites scheduled for launching during the year. With the Anik C-2, which will go into orbit in the spring of 1983, the Telesat space segment of the 1980s is nearing completion in both active satellite frequency bands: 6/4 GH_Z (Anik D) and 14/12 GH_Z (Anik C).

Aniks C and D will use new earth station concepts embracing advanced digital processing and control techniques. These powerful satellites will require receiving dishes only a metre wide - half the size and significantly lower in cost than those required by earlier satellites. Using time-division multiple access (TDMA) techniques, the new terminals will demonstrate the following features:

- rooftop-to-rooftop communications
- integrated voice, data, graphics and video teleconferencing services on one digital stream
- network reconfiguration within seconds, minutes or hours as required

- user input ports from 2.4 Kb/s to 1.544 Mb/s
- Programmable control for selected operational modes
- high reliability resulting from fewer component parts or links in the office-to-office connection

4.2.2 A six-month trial of CCG's integrated satellite business network (ISBN) is designed to provide remote data entry, voice communications and on-line banking using 6/4 GH_Z capacity on Anik B to link Bank of Nova Scotia offices. The network will operate on Anik C's 14/12 GH_Z transponders. Allowing direct-to-user communications, it will provide a wide range of communications services for large and medium-size companies. ISBN will not only provide communications within Canada, but between Canada and the United States as well as overseas via Teleglobe Canada gateways.

4.3 Pushed by worldwide economic recession teleconferencing is predicted to become increasingly useful on an international scale this decade. Demand will force prices down while psychological barriers will dissipate under increased familiarity. Privacy when necessary will be achieved through coding, and telewriting will mean instant reproduction of sketches, graphs and diagrams on a video screen. The addition of on-the-spot-access to international data bases will add another dimension to teleconferencing.

Today audio teleconferences suffer acoustical problems related to feedback and reliability, voice quality and protocol (such as determining speaker priority without visual cues). At the same time videoconferencing is plagued by the complexity of connecting more than two videoconference rooms simultaneously, limited availability and limited interconnection among cities. As well, it is relatively costly. Ready availability of wideband channels will sharply increase its use. Full motion videoconferencing has been shown to be of little advantage and will not be in demand to any extent in the foreseeable future.

Videoconferencing is on trial on both the domestic and international scenes through the ISBN. By means of the international satellite link to Europe provided by Teleglobe Canada, European and Canadian centers are using standard television broadcast facilities and existing conference studios to permit videoconferencing in the international business community. The second phase of the plan will implement an experimental hybrid (video/audio/ graphic) teleconferencing service under an applied research and development project.

4.4 Speech recognition and voice response, two distinct, though related, technologies, have been developed separately, with few companies commercially engaged in both.

Voice response is a sophisticated electronic reconstruction of pre-recorded voice patterns. Actively marketed now in North America, it is the more advanced of the two.

Speech recognition systems, which require that a computer record, interpret and take action on what is said, are more rarely available. This technology has progressed to the point where data can be entered into a computer via the telephone line (even without a touchtone set). However, although up to 200 isolated words can be recognized by some systems, the state of the art is still in the infant stage.

Separately and in combination these two technologies represent dynamic possibilities in the data entry and retrieval fields and are expected to generate a booming business in future years.

4.5 Voice store and forward messaging is a vital component of office automation and, according to The Yankee Group (a Cambridge, Mass. consulting firm), "will shape the business and communications markets of the 1980s." Not an idle prediction when we realize that voice messaging is credited with increasing productivity by up to 25 per cent, decreasing telephone tag, reducing the number of in-house memos by up to 60 per cent, preventing the loss of urgent messages and reducing the problems posed by time zone differential and travel. And the technology is still young. Electronic Communications Systems (ECS), one of the prominent enterprises in this field, installed its first voice message system at the 3M Company in St. Paul early in 1980.

Unlike the popular computer-based messaging services, store and forward voice messaging eliminates the need for keyboard terminals. At the same time, for long storage retention the cost of voice storage is comparatively greater.

By means of the telephone the system permits the user to dial the code or telephone number of the person or persons to be addressed and record a verbal message which is digitized, stored and delivered either by depositing the message in the recipient's electronic mailbox for playback when messages are requested or by dialing the telephone number to force delivery. Messages can be sent to off-system recipients as well as registered users.

Advantages are obvious: Around-the-clock availibility means transmission can take place in off-peak hours when rates are lower; it extends the work day; increases personnel availability; and overcomes time zone differences. Voice mail service is usually provided by attaching specially designed computer equipment to a touchtone dialing telephone system. No modification of the system or telephone instruments is required and several voice mail systems at various domestic and international locations can be tied together to form a network.

In the United States ECS Telecommunications, Inc. is a leading American supplier whose Voice Message Exchange (VMX) is installed on the customer's premises and accessed through the PBX or Centrex. Wang Laboratories, Inc. have recently designed the Digital Voice Exchange (DVX) for integration into future office automation systems. This system can be accessed from any place at any time to record and receive audio messages called voicegrams.

These user friendly systems, based on a technology in which the cost is dropping rapidly, have prompted predictions that the American market for voice mail services may reach as high as one billion dollars as early as 1985.

4.6 Although voice-messaging offers many advantages, text-based systems will remain essential for long or complex messages. Together they represent a major movement away from the traditional mail service. According to the American-based International Resource Development Inc., paperless mail will be a $5-billion service by 1992.

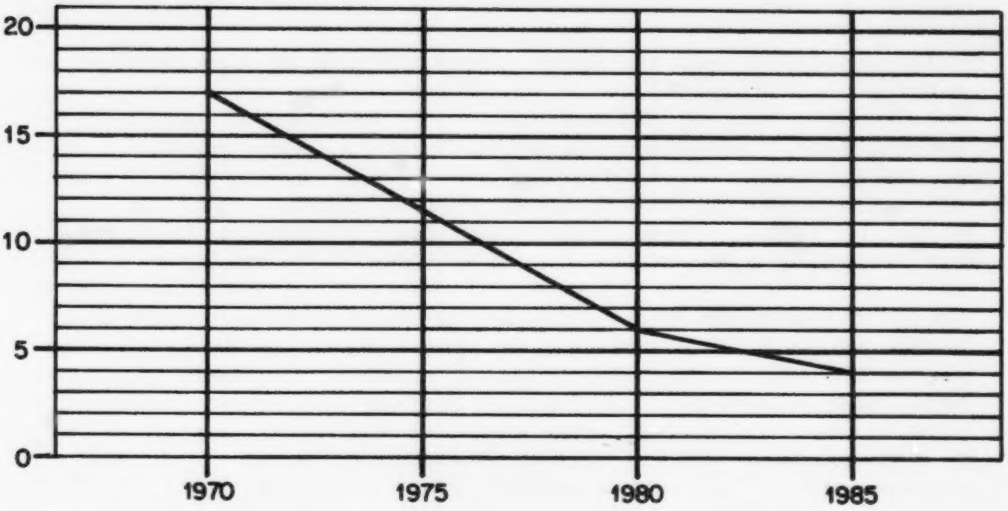
New offerings to handle electronic mail in the automated office appear daily. This area is changing so rapidly that some consider Teletex will not have a major impact on the market as progress will quickly overtake the communicating word processor and focus directly on the use of high power computer-based workstations.

4.7 Advancement in technology continues to bring about unprecedented changes in telecommunications products, equipment life and cost. In all areas new procedures are consistently cheaper, more powerful, more reliable and more compact than their predecessors. The microprocessor, a typical example, has advanced four generations in 11 years:

1971 - 4 bit
1972 - 8 bit
1978 - 16 bit
1981 - 32 bit
1982 - 64 bit

This innovation has obviously had an impact on equipment life. Telephone PABX life expectancy, for instance, has taken a sharp plunge - a drop of 11 years between 1970 and 1980. (See Figure 2.)

FIGURE 2



4.8 Some notable product advancements are:

4.8.1 Stand-alone digitizers for map-making and reading combine both plotter and display into complete systems; graphics systems allow scanned line art and photographs or computer-generated graphics to be merged with text; text-editing machines offer combined keystroke memory and graphics and act as off-line terminals for typesetting systems; teleprinters and word processors offer workstation flexibility by means of portable packaging and communications capability.

4.8.2 An intelligent copier-printer is now available from Royal that can "compose" documents from non-digitized material stored in a word processor. It allows pictures and charts to be inserted into the text for printing.

4.8.3 Digital facsimile devices have the potential to communicate with other office equipment, word processors and computers, as well as interface with both local and distributed communication networks. This means that far from approaching its demise - as some have devined in the recent past - facsimile continues as a link in integrating information handling functions. Today's digital facsimile device, as opposed to its analog counterpart, can transmit a letter-size document in less than 30 seconds over a regular telephone line. The high speed devices (one minute or less per page) provide added features such as encryption, security identification code and delivery verification. While costs are higher for digital facsimile machines, some savings are achieved through reduced transmission time. In addition, improved copies with higher resolution are produced.

CCITT-approved standards permit Group III-compatible devices (the subminute-speed group) to transmit and receive to and from each other regardless of manufacture. At the time of writing, the international standards agencies are working on Group IV recommendations, which will address devices having still higher resolution and use ARQ techniques with data networks to ensure errorfree document reception. The Group IV devices are designed for facsimile transmission over public data networks.

The addition of character-scanning to the facsimile terminal will result in even faster transmission times and lower costs than have been achieved to date. By character-scanning alphanumeric characters, only a few bits of information per number or letter will have to be transmitted, thus reducing the total number of bits used to transmit the contents of a document. Logos, signatures and graphics will still be scanned by the facsimile unit.

4.8.4 Some departments have provided another scanning device, the Optical Character Reader (OCR), to improve efficiency in the preparation of typed copy. This equipment allows the first draft of a document to be typed on a conventional typewriter with certain fonts or type styles before being read electronically on to word processor disks. Once recorded on disks, further revision can be accommodated on the word processor, eliminating the necessity for repetition of keyboarding by word processor staff.

4.9 A new generation of large-scale integrated circuits to be used as the link between telephones and switching machines was developed by Northern Telecom Ltd. and announced in September, 1981. By permitting a number of key processes to be performed on a single chip, the cost of telecommunications switching equipment used by business is expected to be reduced.

4.10 Five Canadian manufacturers were producing Telidon equipment in 1982. Increased production and competition have resulted in improved quality and decreased price. The basic Telidon terminal ($2400 in 1979) is expected to retail for about $300 in 1984.

Telidon applications range from stock market information services in Toronto to agricultural service in Manitoba and California to banking in Buffalo to tourist information in Newfoundland to a baseball statistics data base developed in London, Ontario.

Novatex, the first international service using Telidon technology, has begun operations in several Canadian embassies and consulates. It will be used to serve businesses, government agencies and others in the international community.

5. Government Research and Development

Japan, the United States and France all devote more than two per cent of their GNPs to research and development. To raise the relative level of Canada's investment in R&D to approach that of other countries Canada has undertaken to meet a target for Gross Expenditures on Research and Development (GERD) of 1.5% of GNP by 1985. One-third (0.5%) of that total is to be provided by the federal Government, one-half by industry and the balance, one-sixth, by provincial governments, universities and other services. The electronics industry spends more on R&D than any other industrial sector and performs nearly 25% of all industrial R&D in the country.

In 1981 Canada spent 1.07% of its GNP on R&D. This compares with 1.29% in 1967 - our peak year to date. According to the Canadian Advanced Technology Association the country should aim to achieve three per cent by the end of the decade.

The federal Government's share of GERD in 1981 accounted for 0.047% of the GNP. Its expenditures were 23.7% greater than in 1980/81 and are predicted to be 16.3% more in 1982/83 than in 1981/82. Each of these percentages represents more than $40M in excess of the amounts required to achieve the 1985 goal.

The communications and space share of GERD in 1981/82 increased by 28.7% and 8.7% respectively over the previous year. Federal science expenditures in communications R&D in '82/'83 are estimated as follows:

Department of Communications	31.9M
Natural Sciences and Engineering Research Council	3.8M
National Research Council	2.6M
Supply & Services (unsolicited proposals)	1.2M
Others	0.2M
Total	39.7M

1982/83 space science and satellite technology R&D expenditures will amount to $55.7M.

Some programs funded by the federal Government are described below.

5.1 Office Communications Systems (OCS) Field Trials

5.1.1 The first phase of the OCS program, with an authorized budget of $2.5 million, ended in the first quarter of 1982. It consisted of a feasibility study for implementing the field trials as a vehicle for industrial development and for planning the strategy for Phase Two. Accomplishments included the development of a field trial methodology; studies and reports on market forecasts, international trade trends and other matters; social and behavioral research to evaluate human impacts; a public information program, which included a film and a booklet, the publication of a nationwide survey of more than 50 Canadian office systems consulting organizations, and the initial preparation of a catalogue of Canadian office equipment manufacturers.

5.1.2 Phase Two of the program was approved by Cabinet in April 1982 with a budget of $12 million. To be carried out over the following four years, it is focussed on major industry field trials in federal departments to provide industry and government with experience in designing, planning, generating and assessing integrated electronic office systems. Several objectives have been defined:

a) to allow the government to measure the effectiveness of new technologies in improving the quality and efficiency of its services to the public;

b) to address the social and economic issues;

c) to research leading-edge technologies, productivity measurement and areas of related interest;

d) to support field trials of new Canadian office equipment and systems within federal Government departments. New integrated office systems developed and tested in these trials will lead to proven products for sale domestically and internationally.

The social and economic issues to be addressed will include working conditions, employment patterns, productivity, worker health, and individual privacy. The implications of new office systems as they affect employment opportunities for women will be examined, as well as alternative methods of implementing the technology and methods of training and retraining office workers. Guidelines for the implementation and evaluation of the field trials will be developed by OCS.

5.1.3 The first trial, involving Bell Northern Research, Bell Canada and Northern Telecom, is comprised of three phases: Phase I, to last 12 months, will define functional requirements for office automation systems for managerial, professional and clerical workers. During the second phase the company will provide automated office support for between 50 and 100 users in two or three geographically separate sites. It will test text messaging, file handling, text processing, teleconferencing, decision support tools and public data base access. Bell system developments on trial are the Datapac switching telephone network, iNET intelligent gateway, Telidon Vista videotex system, Envoy 100 public message service, SL-1 switching system and Displayphone executive workstation. In the third phase several hundred workstations will be tried at about 10 sites and a set of more advanced functions, such as decisional support, will be implemented.

5.1.4 The second field trial was proposed by Office Communications Research Associates (OCRA), a consortium of Canadian companies and will consist of four phases lasting three years. Coaxial cable will be used as the local broadband access network transmission system and the CNCP microwave network (plus Telesat satellite facilities where necessary) will be the transport vehicle for inter-city transmissions.

In Phase I a field site will be selected, user requirements will be analysed and the field trial system designed. Phase II will involve training, implementation of a limited system with off-the-shelf equipment and selection of measuring techniques. Phase III proposes to use 100 to 200 workstations distributed across Canada for the further planning, training and development of hardware and software for office equipment and systems. In Phase IV up to 2,000 workstations will be installed for an 18 month trial concerning the purchase and installation of advanced systems and services, operation of the office automation systems, performance, evaluation, systems modification and assessment. A fully operational system would then result.

5.1.5 Systemhouse Ltd., a Canadian software and systems company, proposed the third field trial, for development of new software to integrate office workstations with local access networks, data processing facilities and private and public communications systems. The focus will be on office clerical, managerial and professional functions, activities and personnel.

5.1.6 A study has been conducted to assess the office automation needs of senior management and the Policy Sector of the Department of Communications. In particular, it focussed on budgeting, management of correspondence, messaging and communications activities in the department's headquarters and regional offices.

5.1.7 As well, Officesmiths, Ltd. an Ottawa-based software company, will develop an "electronic filing cabinet" and an automated business manuals management system. The "filing cabinet" is a software program which runs on various microcomputers to allow for access and retrieval of office documents and information stored in electronic form. In the trial this capability will be applied to the administrative needs of Energy, Mines and Resources.

If successful, procedure manuals for official languages, personnel and finance policy will be incorporated into the system. The long-term goal is to integrate a wide range of administrative support functions so that the system can be used for all administrative activities in the department.

5.2 Fibre Optics

Fibre optics technology is still relatively new in terms of development but much older in basic theory. The concept of transmitting telephone signals by light waves was recorded by Alexander Graham Bell nearly 100 years ago.

Major categories to which this technology is currently being applied are the telephones, computers, cable television and military installations. Ongoing research is taking place at the DOC/Communications Research Centre, which is studying the technical feasibility and optimization of using fibre optics in local area networks and developing key technology.

As well, the DSS Science Centre has awarded contracts in the field of fibre optics technology, which have resulted in (among others) the study of testing methodologies for fibre optic systems by Bell Northern Research, and efforts by the Canadian Instrumentation and Research Limited 1) to develop an experimental fibre optic hydrophone and 2) to study and demonstrate optical fibre magnetic field sensors.

Phase II of the fibre optics field trial programs for Elie, Manitoba has been essentially completed. One hundred fifty residents of Elie and nearby St. Eustache (two farming communities) that relied on party lines and rooftop antennae now receive single party, digital telephone service, nine TV channels, seven radio signals (including FM stereo) and Telidon. The trial concluded on schedule, but evaluations are still in progress. A final report is expected to be printed in the Fall of '84. Pending Treasury Board approval, assets of the trial will be transferred free of charge to MTS is return for maintaining the system. Trial sponsors will have right of use.

5.3 Satellites

5.3.1 The Anik B satellite, expected to terminate its useful life in the Spring of 1987, is supporting a number of Government field trials described in Section F 2.2.1.1.

5.3.2 Funding of $17M was approved in the Spring of 1982 for Phase B of the Mobile Satellite (MSAT) program undertaken by DOC and DND. Phase A studies were conceptual. They showed that MSAT is feasible and a commercial satellite could be economically viable. The purpose of Phase B is to define the design requirements of a multi-use demonstration vehicle and the economics of an operational mobile communications satellite.

A study addressing the issues of interconnecting the proposed demonstration system and later the operational MSAT network with the government network was completed by the Government Telecommunications Agency. Needs, economies, cost/benefit and system concepts were investigated. Interconnection would permit federal Government departments to be involved in experiments, field trials and pre-operational use of MSAT.

MSAT studies have determined that in 1981 there were 380,100 mobiles requiring, other than metropolitan area only, service within the government and industry sectors of Canada. This number is projected to grow to 950,000 mobiles in the year 2001. Currently these vehicles are being served by conventional terrestrial mobile radio. Of the 380,100 mobiles in the above category, 68,500 are associated with the multi-level government sector and these are projected to grow to 115,000 by 2001. Of the five basic services covered by the general term "mobile radio service", only the Mobile Telephone Service (MTS) is of interest from the point of view of the federal Government telephone network since none of the others may be directly interconnected to it.

The MTS as presently conceived is a system which enables a mobile, equipped with a radio-telephone, to set up connections through the switched telephone network. In effect, it is an extension of the normal telephone facility to the mobile. The limited range of the terrestrial cellular mobile radio systems means that users have to remain within about eight miles of a base transmitter in order to receive acceptable service. With the introduction of a satellite communications system the range over which the mobile telephone service may be received is extended to encompass virtually all of Canada. Mobiles located many hundreds of miles from a field base station would therefore have full access to large metropolitan centres by direct telephone link. In principle, that telephone link could be extended to any location in the world, if required.

It may be assumed that the MTS capability will be an important offering of the MSAT network. As such, the capability will automatically exist for interconnection between telephone sets in the Government network and sets in the mobiles; this interconnection could take place through the Public Switched Telephone Network. Whether a separate access post for the Government network is justifiable will be measured by a number of factors. Some of these are:

i) additional MTS features required for Government users which are not available in the public MTS, e.g. high speed data
ii) economic attractiveness of tariff rates
iii) reduction in DDD toll charges by using the Government inter-city network
iv) regulatory constraints.

5.4 Telidon

Under the Telidon Industry Investment Stimulation Program (IISP) the federal Government has arranged to have 6,000 Telidon terminals built by Canadian firms and made available for use in new Telidon systems operated by the private sector. Funds have been provided to 52 successful applicants who have agreed to match the Government's investment by buying at least an equal number of Telidon terminals and to pay for content development, communications charges, salaries and other operating and marketing costs. $10.5M was to be spent on the program in 1981 and 1982.

5.5 Decentralized Bibliographic Communications Network

An initiative towards the objective of achieving a nation-wide decentralized bibliographic communications network has been taken by the National Library through its participation in iNET trials. The pilot project will test the utility of new telecommunications technology for bibliographic data interchange.

The National Library will coordinate a group of six library participants which will develop and test computer interfaces to the network including network directories; the derivation of bibliographic data from diverse data bases; electronic messaging for interlibrary loan; the application of videotex and videodisc to library applications; and prototype automatic data transfer between disparate bibliographic systems. Important data for future technical network operations and development are expected to be provided from the evaluation of the pilot project.

5.6 Semi-Conductor Technologies

The National Research Council has been assessing what supporting role its laboratories could provide in semiconductor device R & D. A likely possibility would be provision of a national facility available to industry, universities and other government organizations which would be equipped with analytical instrumentation applicable to a wide range of semi-conductor technologies. Work would include materials research; manufacturing methods and procedures for devices and microcircuits; design, construction and testing of microcircuits for special applications; and research into the effective application of microcircuits. It could also house national standards labs. Such a facility could mean repatriating semiconductor production of the order of $500M a year within five years. This would be in line with the 1982 recommendations of the Science Council in its assessment of the future of the Canadian high-tech industry.

5.7 University Research

The Department of Communications will provide $1,224,804 in 1982/83 to 22 Canadian universities for research projects. Of the 52 contracts to be awarded, 35 (accounting for about two-thirds of the funds) are allocated under the University Research Program. The remaining 17 are funded under the Program for the Promotion of French-Language Centres of Excellence.

Related to the federal Government's responsibilities for the regulatory, social, economic and technological aspects of communications and culture, the two research programs are designed to develop centres specialized in these sectors within Canadian universities, as well as to assist in the training of specialists for industry, government and universities.

Generically speaking, studies are being conducted in the fields of mobile radio, fibre optics, videotex, communications satellites, radio-relay systems and the allocation of spectrum frequencies.

Three research projects commissioned on behalf of the Government Telecommunications Agency were completed in 1981/82. They were reported under the following titles:

1. Development of Guidelines for the Evaluation of Proposed TELIDON Applications (Carleton University) -

   This report addresses the evaluation of videotex services in the federal Government. A set of guidelines concerning the issues to be addressed in the evaluation of proposed Telidon applications is developed in the context of recent experience with Telidon.

   The guidelines fall into the categories of Planning Process, Organizational and Social Aspects, Economic Aspects and Technical Aspects. The report also presents procedures for using the developed guidelines.

2. Communications Controller for Word Processors (Queen's University, Kingston) -

   This study provides a design tool for defining the system requirements and technical feasibility of an intelligent communications controller for word processors. Such controllers would permit a number of word processors to share communication lines and other common resources such as high speed printers, as well as provide communication between the terminals themselves. In providing the latter service it would perform protocol translation to permit interworking between word processors.

   The report includes a listing of a simulation package developed to provide an analysis of the quantitative parameters of performance measurement as a function of the controller configuration.

3. Development of Shared Local Communications Network Topology (University of Windsor) -

   A mathematical analysis of the economics of local government telecommunications networks is provided; in particular the cost of provisioning a Government building with telephony service in a metropolitan environment. Computerized cost models are developed and used to investigate the Ottawa/Hull network alternatives.

I. APPENDICES

APPENDIX I

CASE STUDIES

1. Health and Welfare Canada's Policy Decision Re Call Codes

Controlling the use of telephone call access codes was one of the suggested methods for obtaining adequate control over the use and cost of telecommunications included in the 1979 Auditor General's Report. An example of the application of policy to control call codes and their resulting costs is Health and Welfare Canada's Financial Management Manual, Subject 3.4.17 "Telephone Call Codes".

Publication of this policy was preceded by a report entitled "Government Telecommunications Service - The Telephone System - Telephone Access Codes - An Analysis of Use and the Financial Implications of the System in National Health & Welfare", D. Woodward, July 16, 1980.

This analysis identified the problem as cost related - mainly human, in that 51.52% of Health & Welfare total telecommunications costs in fiscal year 1979/80 were incurred for long-distance voice communications. Breaking the "Telephone System" into three components (hardware, user-operated system, and operator-assisted system) the analysis pointed out that calls incur a cost, dependent on the traffic pattern and usage. Concentrating mainly on "Call Codes" the analysis went on to explain that the control weakness was not in the number of codes as much as in the number of holders sharing a common code. This resulted in a lack of accountability.

Conclusions of the analysis included the following suggestions:

a. The government intercity telephone access authorization code/card problem is of human not system dimensions - users not aware of costs involved, believing it to be free or billed as a standard charge irrespective of usage.

b. Cost control relates to accountability which in turn relates to administrative arrangements employing the authorization codes efficiently and issuing "live" calling guides judiciously.

c. Cost control could be attained by issuing codes to each Responsibility Centre Manager who justifies the need and is personally accountable for costs incurred. It is incumbent on managers to issue cards only on an "as required" basis and to ensure that expenditures were for government business only.

d. Cost analysis is desirable to advise the Branch Head of the level of expenditures incurred per code.

e. Clear instruction should be provided to code users on the most cost-advantageous method of long distance calling.

f. That a financial policy be designed for call codes.

Accordingly, in October 1981 Health & Welfare issued its directive showing as its purpose, "To state departmental policy concerning the authorization and control of telephone call codes". The directive virtually prohibits issuance of Class A and Class S codes except under exceptional circumstances, as well as discouraging issuance of Class B and Class C codes because of the ready availability of alternate calling methods and the possibility of abuse. Listing several other methods of placing long-distance telephone calls it recommends that the issuance of call codes be restricted to situations where employees regularly generate a high volume of long-distance telephone calls in the course of carrying out assigned duties and (a) regularly are in travel status where there is no access to the government intercity telephone network by means of a government telephone; or (b) there is no other practical method for recovering the cost of official telephone calls.

Decision guidelines for reviewing a request by an employee for a telephone call code are given as well as cost considerations being set out.

A policy of one call code to one person is recommended with the designated holder accountable for the call code's use and the costs incurred thereby. Further, branches are required to report annually to the Deputy Minister on the use of telephone call codes.

Through the publication of this firm directive Health and Welfare Canada have illustrated development of telecommunications management policy. Having formerly found telephone call codes difficult to control, discipline has now been achieved utilizing a financial policy to place the authority to issue and the responsibility for the cost at the level of Branch Head.

2. Transport Canada's Application of Treasury Board's Telecom Policy

The Telecommunications and Electronic (T&E) functions within Transport Canada have been reviewed frequently over the past few years with each review expressing concern over the role, management and coordination of the function in the Department. Compliance with Treasury Board's APM Chapters 435 and 436 has been achieved with the establishment of a departmental steering committee and an internal working committee which sets firm policy directives and guidelines. Terms of reference for these two committees - Transport Canada Telecommunications and Electronics Committee (TCTEC) and the Inter-departmental Telecommunications and Electronics Committee (ITEC) - as well as a delineation of their responsibilities and authority for their functions was published at the Deputy Minister level.

The Transport Canada Telecommunications and Electronics Committee (TCTEC)

The executive level of this new two-tier committee structure is chaired by the Senior Assistant Deputy Minister and oversees, through semi-annual meetings, the activities of the ITEC. TCTEC provides a central body for the review and approval of major T&E issues, normally those of departmental scope and/or having significant policy and resource implications. Specifically the committee:

- ensures that Transport Canada's T&E policies and programmes fully reflect both governmental and departmental policies and requirements;

- approves the mandate of the ITEC as described and in the responsibility matrices;

- ensures that the responsibilities and tasks assigned to the ITEC are carried out as planned;

- provides directions and advice to ITEC on the coordination of activities;

- examines problems arising from ITEC deliberations and provides guidance on recommended action as appropriate; and

- reviews special reports or issues related to T&E referred by other government departments or agencies or arising from central agency directives or observations.

Intra-Departmental Telecommunications and Electronics Committee (ITEC)

This committee, chaired at the Director level, acts as the focal point for all T&E matters affecting the Department as a whole. Members of this Committee represent management of all telecommunications and electronics functions within the Department. Specifically the committee:

- is the focal point for all T&E matters affecting the Department as a whole;
- reviews and makes recommendations on Departmental T&E policies;
- identifies activities that fall within the responsibilities of the Committee;
- is the focal point for ensuring effective Departmental coordination and direction on all T&E matters as defined;
- reviews T&E policies and directives issued by Treasury Board and makes recommendations to TCTEC to ensure that these policies are being adhered to;
- performs the function of the Telecommunications and Electronics Coordinator as outlined in Treasury Board Administration Policy manual chapters 435 and 436 with the Chairman acting as the spokesperson for the committee;
- maintains an inventory of all T&E related committees and subcommittees.

Efforts of ITEC during 1982 centered on the assessment and planning of Departmental compliance with APM 435 and 436, more specifically:

- development of an interpretative definition of Telecommunications as the term relates to the two above noted chapters;
- restructuring of departmental financial coding for telecommunications expenditures;
- initiation of a departmental update of the telecommunications audit conducted by the Auditor General in 1979;

- an in-depth review of the two above noted chapters to determine applicable directives and guidelines and the current degree of compliance with their provisions by the department.

In conjunction with the review of APM 435 and 436, a revision of the expenditure reporting code structure is approaching completion. Although some improvements in the line object codes were implemented as of April 1982, this amendment will provide line object codes to be implemented effective April 1, 1983 for all classes of "Telecommunication" expenditures of $25,000 or more.

Efficient and effective management of telecommunications facilities and services within Transport Canada have been and will be enhanced through the firm guidance and policies being supplied by the aforementioned committees.

APPENDIX II

READING/VIEWING GUIDE

Canadian Office, edited by Bruce Glassford, Whitsed Publishing Limited.

A monthly publication dealing with the various facets of office automation.

Coates, Sharon, The Office of the Future, Department of Communications. Available from Information Services Division, Department of Communications, Ottawa, Ontario, K1A 0C8 (613)-995-8185.

Designed to contribute to public awareness of issues of importance to the development of communications in Canada. Industry and Government are urged to cooperate to develop a Canadian automated office industry.

Communications and the Future: Prospects, Promises and Problems, edited by H.F. Didsbury, World Future Society (United States, 1982). ISBN: G-930242-16-5.

An excellent collection of articles from the world's leading communications experts.

Connaghan, Charles J., The Japanese Way: Contemporary Industrial Relations, Department of Labour, 1982. Available from Distribution Centre, Labour Canada, Ottawa, Ont., K1A 0J2; (819)-994-0543.

An industrial relations reference for use by those interested in new approaches to the changing industrial relations field.

DELTAK Inc. Videocassettes, Resource 7: Management Strategies for Office Automation. 61-0XX. Available through the Informatics Learning Centre, Public Service Commission (613)-997-6083 or directly from DELTAK Inc., Suite 2100, Tower A, Place de Ville, Ottawa, Ont. K1R 5A3.

Consists of five tapes varying in duration from 45 - 90 minutes. Government rate: $60/tape/month.

Employment Impacts of New Technologies, Canada Employment and Immigration Advisory Council, December, 1982.

A study of the issue of new technologies and their impact on employment.

Federal Office Automation Conference papers, Washington, D.C., October, 1982. Available in the DOC library.

A collection of symposium papers and slide reproductions from the third U.S. Federal Office Automation Conference.

In the Chips: Opportunities, People, Partnerships, Labour Canada, 1982. Available from Publications Distribution Centre, Labour Canada, Ottawa, Ontario, K1A 0J2; (819)-994-0543.

A report of the Task Force on Microelectronics and Employment which examines the implications of microelectronic technology on Canada's workplace.

Martin, James, *The Wired Society*, Prentice Hall Inc. (United States, 1978). ISBN: 0-B-961441-9.

Convincingly argues that it is imperative to employ new technologies to tackle our problems and build a better world. Outlines the technological developments of communications which are changing the entire fabric of society in both developed and developing nations.

Planning Now for an Information Society: Tomorrow is too Late,. Science Council of Canada, March, 1982. Available by mail from Canadian Government Publishing Centre, Supply and Services Canada, Hull, Quebec, K1A 0S9 and some bookstores. $4.50.

Assesses the possible effects of microelectronic technology on industry, employment, education, scientific research and individuals.

Stanbury, W.T., Thompson, F., *Regulatory Reform in Canada*, The Institute for Research on Public Policy, Montreal, 1982.

> Section 3. Telecommunications Regulations: Toward More Competition identifies some of the salient characteristics of the existing regulatory system and provides a lucid and informative discourse on recent regulatory and policy decisions, including terminal attachment and system interconnection.

The Electronic Office in Canada, Department of Communications, May, 1982. Available from Information Services, Department of Communications, Ottawa, Ontario, K1A 0C8 (613)-995-8185.

> A comprehensive study of productivity, employment, worker attitudes and technology by the Office Communications Systems (OCS) Program.

The Managerial Implications of Microelectronics, edited by B.C. Twiss, Macmillan, London (1981).

> Covers a wide range of topics of importance to managers who are or will be concerned with the introduction of microprocessors into their businesses. Several authors analyse the effects of microprocessors on end products, on production processes and in the office from a managerial point of view. Non-technical.

Treurniet, W.C., *Review of Health and Safety Aspects of Video Display Terminals*, CRC Technical Note No. 712-E, Department of Communications, Ottawa, February 1982.

> Reviews the factors that contribute to worker complaints when video display terminals are introduced into the workplace and considers the issue of electromagnetic emissions from television displays.

APPENDIX III

CALENDAR OF EVENTS

The following '83 Communications Calendar is reprinted from communications week, published by Evert Communications Ltd., Ottawa.

'83 COMMUNICATIONS CALENDAR

January

16 - 19	Pacific Telecommunications Council, PTC'83, Sheraton Waikiki Hotel, Honolulu, Ha.
19 - 20	B.C. Computer & Office Automation Show, Hyatt Regency, Vancouver, B.C. (416) 252-7791 or (604) 873-4581.
31 - Feb 3	Communication Networks Conference & Expo. The Rivergate, New Orleans, La. (617) 879-0700.

February

10 - 12	National Mobile Communications Expo, O'Hare Expo Center, Chicago Il. (213) 826-6070.
21 - 23	1983 Office Automation Conference, Philadelpha, PA. Deborah Kalbfleisch, (703) 558-3617.

March

8 - 10	National Office Exhibition and Conference. Automotive Building, CNE, Toronto. Sponsored by Industrial Trade Shows of Canada.
14 - 16	Second Annual Phoenix Conference on Computers and Communications, Contact GTE Automatic Electric Lab, Phoenix, Az.

April

10 - 13	National Association of Broadcasters, Convention & Expo, Las Vegas Convention Center, Las Vegas, Nv. (314) 721-7717.
17 - 22	IEEE Infocom 83, San Diego, Ca. Contact (301) 589-3386.
25 - 27	Satcom'83, International Association of Satellite Users, Conference & Expo, Orlando, FA.
27 - 29	Satellite and Computer Communications, International Symposium, Versailles, France. Tel (3) 954-9020 EXT. 600.

May

2 - 5	Canadian Radio Common Carriers Association annual convention and trade show, Edmonton Convention Inn South.
10 - 12	International Computer Show and Conference, Olympic Velodrome, Montreal, Canadian Information Processing Society.
11 - 13	British Columbia Broadcasters, Delta Hotel, Penticton, B.C.
16 - 20	CIPS Conference, Ottawa, theme: "Converging Technologies."
16 - 19	Canadian Cable Television Association, Convention & Expo, Calgary, Alta. (613) 232-2631.

16 - 19	1983 National Computer Conference, Anaheim, Ca. (703) 558-3625.
29 - June 1	Western Association Broadcasters, Jasper Park Lodge, Jasper, Ab.

June

12 - 15	National CATV Convention (NCTA'83), Astro Hall, Houston, Tx.
15 - 17	Satellite Communications Conference (SCC-83), Holiday Inn (Kent Street), Ottawa. Dr. K. Fehr (613) 231-2288.
19 - 22	ICC'83, International Conference on Communications (IEEE), Hotel Sheraton, Boston, Ma. (617) 862-5500.
27 - 29	Videotex '83, New York Hilton, NY, NY. (212) 947-1734.

August

22 - 24	Satellite Communications Users Conference, SCUC'83, St. Louis, Mo. Satellite Communications Magazine, Denver, Co., (303) 694-1522.

September

13 - 16	Cdn Industrial Communications Assembly, Convention & Expo Toronto, Harbour Castle Hilton. Margaret Robertson, (416) 499-4222.
19 - 23	Sixth Int'l Conference on Digital Satellite Communications, Phoenix, Az. Contact: H. Briley, c/o COMSAT, Washington D.C.
26 - 28	1983 Int'l Electrical and Electronics Conference and Exposition Exhibition Place, Toronto Ont. Theme: "Canada's Global Link - Technology and Communications", (416) 445-6641.

October

3 - 6	Eighth Data Communication Symposium, Datacomm, Cape Cod, Ma. (301) 589-3386.
4 - 5	Ontario Cable Television Association, Convention & Expo, Triumph Sheraton, Toronto, Ont. (416) 481-4446.
23 - 26	Cdn Assn of Broadcasters Annual Meeting & Convention Toronto, Sheraton Centre. (613) 233-4035.
26 - Nov 1	Telecom 83 Exhibition, Geneva, Switzerland, ITU, Place des Nations, CH-1211 Geneve 20.

November

14 - 17	Cdn Computer Show, Int'l Centre, Toronto.

1983

WORLD COMMUNICATIONS YEAR

APPENDIX IV

GLOSSARY OF ABBREVIATIONS

ACD	Automatic Call Distributor
ACIS	Advisory Committee on Information Systems
ACS	Automatic Call Sequencer
AECB	Atomic Energy Control Board
APM	Administrative Policy Manual
ARQ	Automatic Request - Repeat
ASCII	American Standards Code for Information Interchange
CBMS	Computer Based Messaging System
CBX	Computer Based Exchange
CCG	Computer Communications Group
CCITT	International Telegraph and Telephone Consultative Committee
CCS	Correctional Services Canada
CIDA	Canadian International Development Agency
CNCP	Canadian National - Canadian Pacific Telecommunications
CRTC	Canadian Radio - Television and Telecommunications Commission
CVCC	Canadian Videotex Consultative Committee
CWP	Communicating Word Processor
DAMA	Demand Assignment Multiple Access
DDD	Direct Distance Dialling
DND	Department of National Defence
DOC	Department of Communications
DOE/AES	Department of Environment/Atmospheric Environment Service
DSS	Department of Supply and Services
DVX	Digital Voice Exchange
EA	External Affairs
ECS	Electronic Communications Systems
EIC	Employment & Immigration Canada
EPD	Electronic Data Processing
EEWD	Enhanced Exchange Wide Dial
EIA	Electronic Industries Association
EMR	Energy, Mines & Resources
EMS	Electronic Messaging System
GDNS	Government Data Network Service
GEMS	Government Electronic Messaging System
GERD	Gross Expenditures on Research and Development
GHz	Gigahertz
GNP	Gross National Product
GTA	Government Telecommunications Agency
HWC	Health & Welfare Canada
IAND	Department of Indian & Northern Affairs
IISP	Industry Investment Stimulation Program
iNET	Intelligent Network
INWATS	In-Wide Area Telephone Service
IOTA	Inventory of Telecommunications Applications
IRC	International Record Carrier
IRD	International Resource Development Inc.

ISBN	Integrated Satellite Business Network
ISDN	Integrated Services Digital Network
ISO	International Organization for Standardization
ITEC	Inter-departmental Telecommunications & Electronics Committee
ITSP	Information Technology and Systems Plan
ITT	International Telephone and Telegraph Corporation
IX	Inter-city
LAN	Local Area Network
LC	Labour Canada
MHS	Message Handling System
MSAT	Mobile Satellite
MSST	Ministry of State for Science and Technology
MTS	Manitoba Telephone System
NCR	National Capital Region
NMS	Network Management System
NPB	National Parole Board
OCR	Optical Character Reader
OCRA	Office Communications Research Associates
OCS	Office Communications Systems
OPEN	Open Protocol Enhanced Networks
OSI	Open Systems Interconnection
OUTWATS	Out-Wide Area Telephone Service
PBX	Private Branch Exchange
PABX	Private Automatic Branch Exchange
PSC	Public Service Commission
PSTN	Public Switched Telephone Network
RCMP	Royal Canadian Mounted Police
R&D	Research and Development
RC-C&E	Revenue Canada - Customs & Excise
RC-T	Revenue Canada - Taxation
SCPC	Single Channel per Carrier
SPC	Stored Program Control
TAC	Telecommunications Advisory Committee
TASC	Telephone Answering Site Consolidation
TB	Treasury Board
TC	Transport Canada
TCTEC	Transport Canada Telecommunications and Electronics Committee
TCTS	TransCanada Telephone System
TDMA	Time Division Multiple Access
T&E	Telecommunications and Electronic
TECA	Telecommunications Cost Analysis
TSO	Telecommunications Service Officer
UHF	Ultra High Frequency
VDT	Video Display Terminal
VMX	Voice Message Exchange
WATS	Wide Area Telephone Service